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Chimneys and Boilers

"Keep Your Information Account Open"

By E. C. Lillie

In the following table the ratio of heating surface to grate shows the number of feet available to absorb the heat generated on each square foot of grate and governs the value of the coefficient.

The coefficient is quoted from the report of Frank L. Busey's experiments in the University of Illinois and expresses the actual number of feet of radiation served per pound of soft coal per square foot of grate per hour.

The rate of combustion showing the pounds of coal consumed per square foot of grate per hour is that deemed advisable and is limited to the capacity of the chimney, but should be low for low ratio boilers and high for high ratio boilers. In other words we should generate no more heat than we have surface to absorb.

The grate area is expressed in feet.

The radiation column expresses the actual number of feet the boiler will carry in coldest weather under these conditions, counting exposed pipes as radiation.

The product of the coefficient times the grate area times the rate of combustion gives the amount of radiation.

By changing the rate of combustion you change the rating, which explains the variation in boiler ratings.

Note the increase of the value of the coefficient with the heating surface ratio. This shows conclusively the value of higher ratios, but to use them requires chimneys of ample size and height.

The product of the grate area times the rate of combustion, gives the maximum fuel consumption per hour. The average will be about half as much.

The above data are based on measurements of the 25 inch size, but is approximately correct for other sizes.

Square boilers have a ratio of about 11½ to 1 and carry coefficients of 26 for steam and 41.6 for water, hence small square boilers should give way to round boilers with high ratios, where the chimney conditions and water line permit.

The efficiency of square boilers can be increased by covering the rear grate bars, as this increases the ratio. To do this without lowering the efficiency of the rear section requires that the port hole from the combustion chamber to the flues be located at the rear corners of the boiler.

Each grate bar omitted will increase the ratio about two points.

Higher rates of combustion are possible in large boilers than in small ones. Extremely high rates of combustion

Data on Round Boilers.

Diameter of grate.	No. of horizontal sections above fire.	Ratio of heating sur. to grate.*	Coeff. for steam.	Coeff. for water.	Grate.	Coal consum. per sq. ft. grate per hr. Pounds.	Actual rad. steam.	Actual rad. water.
19 in.	3	11½	26	41.6	1.75	4	180	290
"	4	15	28.5	45.6	"	4½	230	365
"	5	19	31	50	"	5	275	440
"	6	23	33	52.8	"	5	290	470
22 in.	3	11½	26	41.6	2.4	4	240	380
"	4	15	28.5	45.6	"	4½	310	490
"	5	19	31	50	"	5	380	600
"	6	23	33	52.8	"	5	435	696
25 in.	3	11½	26	41.6	3 1-7	4½	360	580
"	4	15	28.5	45.6	"	5	445	715
"	5	19	31	50	"	5	490	785
"	6	23	33	52.8	"	5½	560	896
28 in.	3	11½	26	41.6	4 1-8	5	530	848
"	4	15	28.5	45.6	"	5½	640	1024
"	5	19	31	50	"	5½	700	1120
"	6	23	33	52.8	"	6	790	1264
31 in.	3	11½	26	41.6	5	5	650	1040
"	4	15	28.5	45.6	"	5½	790	1260
"	5	19	31	50	"	6	910	1500
"	6	23	33	52.8	"	6½	1070	1712
34 in.	3	11½	26	41.6	6	5	780	1245
"	4	15	28.5	45.6	"	5½	940	1510
"	5	19	31	50	"	6	1120	1800
"	6	23	33	52.8	"	6½	1290	2064

*Values in different makes.

permit a very high rating, but unless we have enough heat absorbing surface to receive the heat generated, it results in high stack temperatures and a consequent loss of heat through the chimney.

The ratio of heating surface to grate area does not always govern the efficiency per pound of coal, as in some boilers much of the surface is so placed as to have only a nominal value. All surface should be in the line of flame travel. The efficiency of surface to absorb radiant heat decreases inversely as the square of the distance from the radiating surface. Horizontal surface, according to Box, has double the efficiency of vertical surface.

Radiant heat is emitted in parallel lines at right angles to the radiating surface, and its efficiency decreases in the same ratio as the angle, at which it strikes the heating surface, departs from a right angle.

Were it otherwise the poles would have the same temperature as the equator.

Horizontal surface abounds in round boilers while vertical surface abounds in some square boilers.

We can select high ratio round boilers but the ratio is limited in square boilers, hence E. R. Pierce was warranted in saying, in his Manual on Steam and Hot Water Heating, as follows:

"As a general statement, based upon an experience covering practically the entire heating territory of the United States, I would say that for either steam or hot water heating, jobs requiring less than 1,000 square feet of radiation for steam, or 1,650 square feet of radiation for hot water, the round horizontal, sectional boiler has proven itself to be more even in its performance, and more economical in fuel consumption, than have the small sized vertical sectional types. That they have given way to the vertical (square) sectional is a proof of the selling ability of the manufacturers and I am inclined to say of the lack of knowledge of heating surfaces and their value on the part of the public."

Let R equal the ratio of heating surface to grate area.

Let C equal the coefficient, showing feet of direct radiation served per pound of coal per hour per square foot grate.

Let G equal the grate area.

Let X equal the rate of combustion.

Let Y equal the actual number of feet of radiation boiler will carry, counting exposed pipes as radiation.

Then CxGxX equals Y.

GxX " lbs. of coal burned per hour in extreme weather.

½ this " average lbs. of coal burned per hour per season.

Take a round boiler with 25-inch grate.

Let A equal boiler with 3 sections above fire.

Let B equal boiler with 4 sections above fire.

Let C equal boiler with 5 sections above fire.

Let E equal boiler with 6 sections above fire.

	R	C	G	X	Y	Steam
In boiler .....A	11½	26	3 1-7	4	325	
In boiler .....B	15	28.5	3 1-7	5	445	
In boiler C	19	31	3 1-7	5	490	
In boiler .....E	23	33	3 1-7	5½	550	

If we have an 8 inch chimney we must use boiler A and serve 26 feet of radiation with each pound of coal per square feet grate per hour.

With 10 in. chimney we could use boiler B and serve 28.5 ft.

With 12 in. chimney we could use boiler C or E and serve 31 to 33 feet.

Boiler E would do 67 per cent more work than Boiler A with 50 per cent more coal.

If we had 325 ft. of radiation we use a 22 in. boiler with 4 sections and use 20 per cent less coal than boiler A would use.

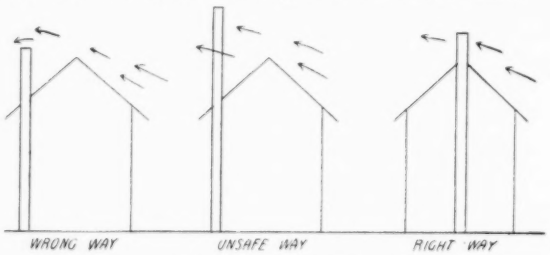
It therefore follows that the draft of the chimney is the all important thing, as it governs the possible value of R, C, X and Y.

If we double X we can double Y, but the draft and R govern X, as with poor draft X will be low, hence R must be low, with a good draft X must not exceed the absorbing power of the heating surface or we will have undue stack loss, hence the value of R must be high to care for a high value of X.

A certain stack temperature is necessary to promote draft and any heat loss through the sides of the chimney requires an extra consumption of coal to replace it, hence chimneys should be warmly built.

Flue linings make a warm construction and to reduce friction to the minimum they should be round with no offsets and as high as possible.

I advise that you use not less than 10 in. size in small houses, 12 in. in larger houses and even 15 in. in very large residences. To secure the best results chimneys should be built through the ridge of the roof, as it is unsafe when building up through the eaves to have them high enough to avoid depressing currents of air when winds are coming from the opposite side of the house.



Sketches Showing Different Constructions of Chimneys.

There is no question but that every advantage given to the draft will result in great saving of fuel, as a good draft permits the use of a high ratio boiler and secures the maximum efficiency per pound of coal, which is the true test of a heating job.

Below I give Mr. Busey's table of coefficients for a good grade of soft coal:

Ratio of H. S. to grate area	Coefficient showing feet of direct radiation served per lb. of coal per sq. ft. of grate per hour	
	Steam	Water
10 to 1	25	40
11 to 1	25.7	41.1
12 to 1	26.4	42.2
13 to 1	27.1	43.3
14 to 1	27.8	44.4
15 to 1	28.5	45.6
16 to 1	29.2	46.7
17 to 1	29.9	47.8
18 to 1	30.7	49.1
19 to 1	31.3	50
20 to 1	32	51.2
21 to 1	32.5	52
22 to 1	33	52.8

Catalogues do not give necessary data, but if you can secure it, multiply the coefficient by the product of the grate area and the rate of combustion, and you have the load the boiler will carry.

Three and four section boilers should not be attached to good chimneys. Five and six section boilers should not be attached to poor chimneys. Architects should not design poor chimneys.

Heating a Swimming Pool

By C. Teran, Member A. S. H. & V. E.

Paper read at the Eighteenth Annual Meeting of the American Society of Heating and Ventilating Engineers, Held in New York City, January 23-25, 1912

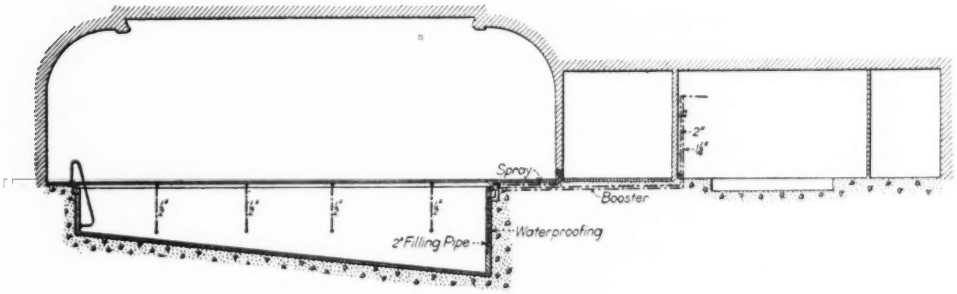
A swimming pool is generally a luxury, not a necessity. For this reason not many are built, and a description of the system installed for Mr. Herbert Coppell at Tenafly, N. J., may prove of interest.

It is housed in a building of one story, and includes the pool room, two dressing rooms, boiler and coal rooms, all on the ground level. The pool is sunk below grade, is built of concrete, waterproofed and lined with English size enameled brick. It is 38 ft. long, 15½ ft. wide and 6 ft. mean depth below water level. The cubical contents are, therefore, 3,534 cu. ft.

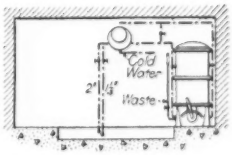
The heating plant was designed to heat this volume of water in 10 hr., or at the rate of 353 cu. ft. an hour. Ten hours is a convenient length of time for heating the water, because the required apparatus is not specially large. If the apparatus were much smaller it would, of course, require a longer time to heat the water, and this time added to that necessary to empty and clean the pool would make the period of time which the pool would be out of commission too long. The time required to empty and clean this pool is 4 to 5 hrs.

The installation includes two cast-iron sectional boilers, a Berryman service heater and a filter. The water is reduced to 30 lb. pressure on entering the building. It is then heated in the Berryman heater by steam generated in the boilers, and it is then filtered and discharged into the pool. For filling a main inlet is used; this enters the pool at the deep end near the bottom; there is also a nozzle above the waterline which is used to produce a spray over the pool.

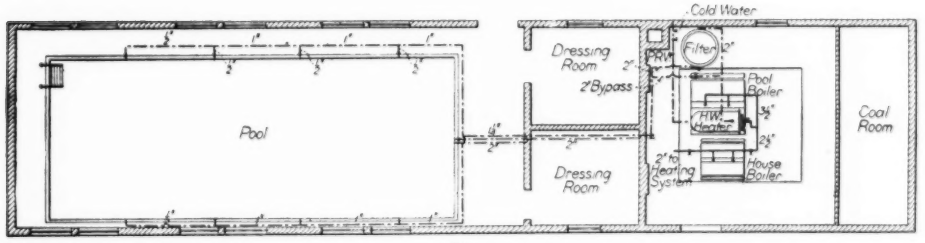
On account of the proximity of the walls of the pool to the outside ground a loss of heat in the water was anticipated and provision made to replace the loss. Careful consideration was given to the various methods that could be used to accomplish this purpose, and injecting water heated to a high temperature into the filled pool was decided upon. The reason for using a high temperature is that the water is not taken from the pool to be reheated, as this would necessitate a circulating pump, but fresh water is used, and by heating it to a high temperature a minimum quantity of water is required and less coal burned. Steam was not considered a good medium, because it imparts a peculiar odor to the water, due perhaps to the presence of oil in the boiler. The water is injected at four points on each side of the pool near the bottom, through nozzles passing through the brick lining and flush with it. This arrangement gives a good distribution, and is neat in appearance. It is found that during the winter months the water loses 2 to 3 deg. F. in 24 hr.



Longitudinal Section



Section through Boiler Room showing Water Pipes



Plan

ARRANGEMENT FOR HEATING A SWIMMING POOL AT TENAFLY, N. J.

In filling the pool the water is heated to 75 deg. F., which, on account of heat losses in transit, etc., gives an ultimate temperature of 70 deg. F. The water injected to make up the heat loss is heated to 180 deg. F.

The large boiler is used to heat the water when the pool is being filled. This was computed as follows:

Cubical contents of pool	3,534 cu. ft.
Cubic feet of water to be heated per hour	353 cu. ft.
Pounds of water to be heated per hour	353 × 62.4 = 22,027
Rise of temperature of the water from 40 to 75 = 35 deg.	
Heat units transmitted to water per hour, 22,062 × 35	771,000 B. t. u.
Coal necessary, to be burned per hour, 771,000 ÷ 8,000	96 lb.
Grate area 96 ÷ 8	12 sq. ft.

A boiler having a grate 40 in. wide by 48 in. long was installed. The other boiler shown is used to heat the building and to heat the water injected into the pool to make up the daily loss of heat; by this arrangement, the necessity of keeping a fire in a large boiler is avoided. As there was no sure method of predetermining the loss of heat of the water in the pool, in selecting this boiler liberal allowance was made for this purpose above what is required to heat the building. The amount of direct

radiation in the building is 400 sq. ft., all behind screens; the boiler is rated at 1,000 sq. ft., and has a grate 21 x 27 in., or about 4 sq. ft.

The service heater was specified of proper size to heat 2,800 gal. of water per hour from 40 to 80 deg. F., with low pressure steam, and it was left to the manufacturers who furnished it to design the proper size heater for this duty. The filter was specified in a similar manner. No automatic temperature control was installed, and none has been found necessary. An even temperature of the water is attained by maintaining a steady fire and regulating the flow of water by hand.

As a matter of precaution against a leaky pool the water pipes were installed so that they do not pass through the waterproofing of the wall of the pool below the waterline. This was accomplished by installing the pipes horizontally under the floor of the pool room and dropping branches to the proper depth in the pool between the waterproofing and the brick lining. All concealed water pipes are brass; other pipes are galvanized iron.

The pool, which may be considered an experiment, has been so satisfactory that Mr. Coppell has ordered built a much larger pool, 44 ft. long by 26 ft. wide, with the addition to his house and the equipment for the new pool has been designed on the same principle as the one described.

CORRESPONDENCE SCHOOL FOR AMBITIOUS YOUNG SALESMEN?

By "The Spectator."

Fortunately business has been so dull in old Porktown-By-The-Lake, that there is practically nothing to offer this week in the way of news.

This bare statement in itself is enough to insure an onslaught of the blue pencil that would land our whole contribution in the waste basket if indeed it should not go further and sever our journalistic neck. But, we have confidential information to the effect that the Editor has laid aside that formidable weapon and has shut himself up with a typewriting machine to pound out another of those forceful editorials about "A Practical Manual of Steam and Hot-Water Heating." So, since there is not the slightest chance that he will be through in time to catch us at it, we are going to cut the news absolutely and indulge a long cherished desire to do something beneficial to mankind. We are going to create a new department which shall be known as Domestic Engineering's Correspondence School for Ambitious Young Salesmen. This title in itself, while as concise as any our ingenuity has been able to devise, is so expressive of our lofty purpose that the most unimaginative will be able to get us, so we shall not go into any tedious description of what may be expected but with all speed set ourselves to delivering a sample of the goods at once.

It is quite likely that many who will join this school are those who are now considering whether they shall become ambitious young salesmen and those who have already made a beginning but are not certain that they have chosen wisely. We feel therefore that in fairness to them we should, at the very beginning give some consideration to the qualifications necessary to a young man who set out to win Fame and Fortune as a salesman. It pleases us greatly to say that these are surprisingly few and simple. Practically nothing—surely nothing irksome or difficult is required. Honesty, we think, should be listed. This is, to be sure, a school of advanced thought and higher education, but we do not care to be led into controversial discussions so we shall always be ready to concede a point even though it may favor some old-fogeyism that the world has not yet consented to discard. Conceding honesty, then; the next important qualification is mental equipment. If you have wasted a lot of time at college posting yourself on engineering or commercial law, or other so-called solid practical stuff, you are hopelessly unprepared for work as a salesman. What you need in your head is a fund of snappy, brisk information. How to tell a Martini from a Bronx cocktail is the sort of knowledge you need. Learn the latest vaudeville airs for whistling purposes. Nothing pleases a customer so much as to have you whistle some catchy air while he writes down an order that he is going to give to you. The latest slang also is excellent stuff to be up on. If you are going to travel you will continuously strike small towns where the trade won't understand one word of the latest slang phrases. You should use them profusely for thereby you will gain the reputation of being a very learned and superior person. Such impressions are invaluable to a salesman. Don't for a minute waste time studying your catalogue or posting yourself on your competitor's goods. Every customer is supposed to have all that humdrum information himself and if he hasn't you can well afford to pay no attention to him.

Another consideration is your general attitude toward life and the world. This is a broad and most important subject. You should deport yourself always in a bored and lack-a-daisical manner. Adopt this attitude always if your customer is inclined to talk about business. He will quickly perceive that you are so well informed on all business matters that it would be a waste of your time to discuss them with you. Such treatment is sure to make him more tractable so that you can well afford to unbend a little while he eagerly listens to a recital of some of the pranks you put over during the few months you spent at college. Don't get into the absurd habit of having respect for other people's opinions. If you are unfortunate in not knowing anything about the matter that is being discussed, do not let that mere trifle deter you. Take any stand you like and stick to it in spite of everybody. You've got to show yourself a man some way.

Someone is likely to ask what we should advise as to the reading of so-called standard works on the subject of salesmanship. Space permits only a few more lines that must be devoted to a suggestion as to enrollment in the school, so we shall have an opportunity to give that delicate question the consideration that it merits and our diplomatic answer will appear in the next lesson at no great distant date.

Enrollment in the school is absolutely free and carries with it the privilege of writing us at any time either to approve or disapprove of any part of the curriculum.

We have to encourage an outspoken frankness in such letters. Let them be as frank and unreserved as our own published counselings shall always be. Foolish conservatism is always a formidable stumbling block in any educational movement. We merely hint at this matter of enrollment. Let it not be thought that we would coerce anyone into an education. It is simply our modest aim to hold forth a golden opportunity to all, unconditioned upon wealth, position, color, religion or politics and those who grasp it shall have their reward, if not in gold then in its equivalent of entertainment.

Methods of Practical Interest in the Heating Trades

Heating Mains and How They Are Installed—Horrible Examples of Heating Practice, Mistakes Made by Some Steamfitters

THE HEATING MAIN.—III.

"Gee Whiz, wait a moment till I get that rummie," cried the boss one day as we went into another part of the building for the purpose of looking at some work. With a don't-give-a-hang movement said "rummie" took the pipe cutters and, turning around, he slammed them upon the pipe that he was to separate.

Down bit the wheels deep into the iron as he twisted and twisted the handle of the cutter. Then he gave a mighty tug to start things off and as the handle came up he got his shoulder and stiff arm behind and pushed the handle around. When the circle was made the cut did not line up into more than half an inch. "Oh, the cutter's on the bum," cried the rummie and just then the boss landed and handed him one. Do you blame the boss? Remember that this happened years ago in a "country down by the sea" and they probably—but that would be too much to expect? If you would know whether the same thing is done to-day, slip into the back room some day and find out.

It is easier to make a straight cut than one that is crooked, if you will take a little pains in starting the tool right. Putting on too much pressure only puts the wheels out of true and soon it will not be possible to make a straight cut. Of course the tool may be repaired, but the chances are that it will never be as good as it was at first. A pipe cut off on the bias is the cause of much mischief. Unless it is mighty good pipe, the tendency is for it to open up just a trifle (sometimes more) and then it will cause a mix-up if you happen to have solid dies and have been fortunate enough to get them caught.

A pipe cut crooked will cause trouble when one comes to make on the fitting, or to make the crooked thing into a fitting when stringing the main. You might be standing on tip toes and holding the pipe while attempting to catch this same thread. Of course you are green if you try to enter threads after this manner, as will be explained later. We will pass that up right now and come back to the cutter. Keep an extra set of cutter wheels and pins on hand in one of the tills of the chest.

A first class tool is like a thoroughbred, it's always ready to deliver the goods. Thoroughbreds, however, require the best of care. A three wheel pipe cutter will raise quite a rim on the pipe and, if using some kinds of dies, this rim must be removed. If you batter it down with a hammer, you harden the pipe and may secure a poor thread as a consequence.

Cut it with a cold chisel or use a large rasp which will do the job very rapidly and effectively. If you have not the kind of a reamer that operates at the same time the thread is being cut, the best time to ream the pipe is when the thread has been cut and the die is still upon the pipe, as it will be then impossible for you to throw the pipe out of true while the die is on the pipe.

The best of eyes can not always see the sand holes in the fitting but it might be well to just cast a glance at the ell or tee as you pick it up to apply to the pipe. If there is any doubt at all to your mind, cast it aside for another, or if short of fittings, at least put the doubtful fitting in a place where it will be easily reached in case that you do have to do a small job of caulking. In a great many cases the smaller sand holes can be fixed quite easily if you just take a hammer and cold chisel and dent the fitting all around the sand hole afterwards hammering same well down.

Lead, soft copper wire, candle wicking and tin foil are all used in caulking when the leak appears at the point where the pipe screws into the fitting. Of all the substances mentioned I prefer the tin foil and have found that it will make good on almost any pressure either steam or hot water as well as on plumbing work. It is easily carried, quickly applied, far more so than the lead or copper wire, and can be had almost for the asking. Sand holes are not the only thing to be looked out for at the bench. Sometimes the fittings are cracked. Now you would think that no fitter could be so extremely careless as to let a cracked fitting get on the pipe at this stage of the game, but it does somtimes occur.

A wobbly bench and a weak or careless steamfitter have committed worse sins than that. Sound the fittings. If you do not know just how a cracked fitting sounds when tapped with the hammer try it out and then you will be in a position to avoid a certain percentage of the drawbacks on a job, before they happen.

We have not got that main swung yet, nor will we have for some little time to come. You see there are about one thousand and one things that have to be attended to before we begin or as we proceed. There is much more to the job than one would imagine, and it's because many people believe it so very simple that we have so many bum outfits in the country, and it gave the steam and hot water heating business a blow in the "solar plexus" the effects of which lasted for many a long year.

Phoenix.

HORRIBLE EXAMPLES.

The illustrations in this article show mistakes, or blunders made by steamfitters, when piping plants for use in ordinary service, although some of them had to be changed before they could be used at all.

Fig. 1 shows a small boiler and engine with the safety valve piped wrong, as there is nothing to prevent steam from blowing directly into the air. None can go to the engine until pressure is raised high enough to open the safety valve. This mistake was discovered by a visitor before steam was raised in the boiler, but not until the main pipe was completed. Originally there was no union in this pipe, as the flanged throttle valve was used to make the final connection. In order to correct the mistake, it was necessary to cut the pipe, turn the safety valve around, and use a flange union, as shown.

On another occasion a steamfitter connected a check valve wrong, as illustrated in Fig. 2. It is quite plain that no water can be delivered by the pump until the check valve is turned "end for end" and properly screwed

on again. This mistake has been made several times, under different conditions, but the most comical case was where one of the craft was telling how somebody else made this mistake, and within a very few minutes he made the same "break" himself.

Fig. 3 shows a locomotive boiler, that was used on a stationary plant, fitted with a water column located so high that if water showed in the glass there was danger of it going over into the engine cylinder. It was actually used in this condition for a long time, although water was not in sight for a greater portion of the time. The

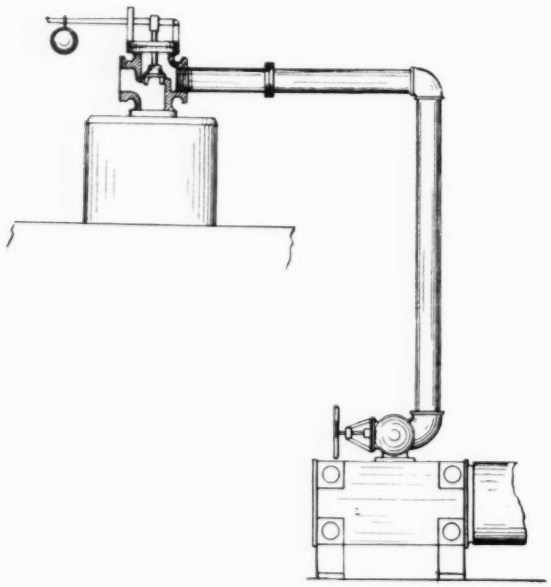


Fig. 1.

engineer would pump water into the boiler until it appeared in the glass, and then disappeared as it rose and fell in boiling, then he allowed it to fall slowly for some time, not knowing just where it was, then pumped it up again. It is quite possible that the water level never fell low enough to be dangerous, and the boiler did not explode on this or any other account, but it was far from a safe plan to follow. During part of the day the engineer expected to hear heavy pounding in the cylinder,

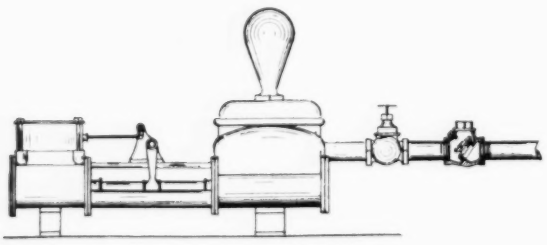


Fig. 2.

denoting too much water, and for the remainder he wondered if his boiler was about to be burned for lack of water. In many plants the engineer would not allow such a state of affairs to exist, as the remedy is very simple, consisting of shortening the lower connection, and lengthening the upper, but in this case he simply used what was provided without serious complaint.

Fig. 4 shows how a steamfitter connected a water column to a tubular boiler. The height is correct, but there are no valves in the connections, consequently if repairs to the column are necessary, the boiler must be laid off for this purpose, causing much delay, and loss of heat. While engineers do not all agree on the subject of having

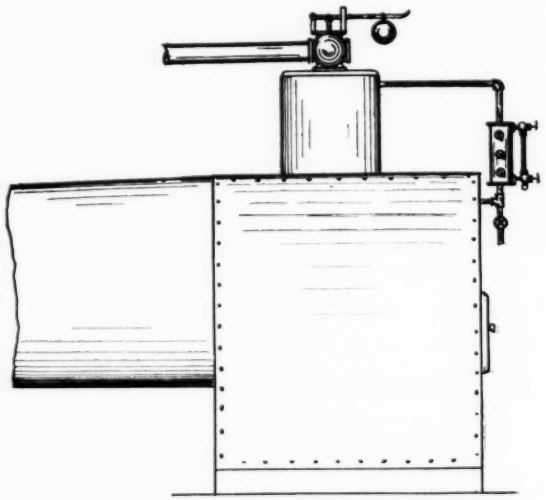


Fig. 3.

valves in water column connections, there can be no difference of opinion about the necessity of having a drip valve in the lower connection, but none was provided in this case, hence the engineer cannot prevent the collection of sediment at this point. No steam fitter can

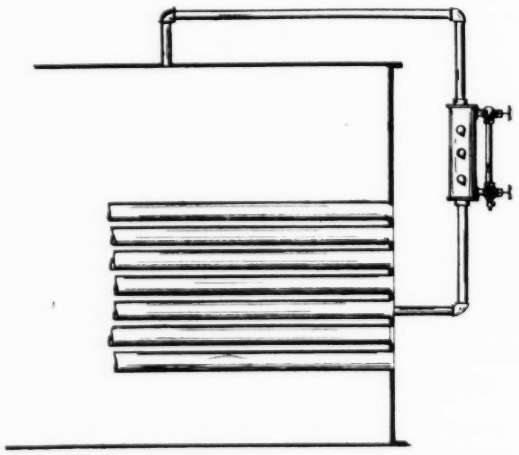


Fig. 4.

afford to omit such a detail, as it operates to discredit the whole craft, when many of them are worthy of confidence on account of good work done in installing new plants and repairing old ones. W. H. Wakeman.

Graphite and Gravity.

A well known professor of one of our great universities delights in telling of his experience with an inventor of the unlettered genius type who came to the professor with a model of a perpetual motion machine.

"H'm, looks plausible," observed the professor, "but it won't work. What are you going to do about gravity?"

"Gravity!" said the visitor scornfully. "T'ell wit' gravity; we'll use plenty o' Dixon's Graphite."

Air-Conditioning Apparatus—Principles Governing Its Application and Operation

By Willis H. Carrier, Buffalo, N. Y., Associate Member of A. S. M. E., and Frank L. Busey, M. E., Buffalo, N. Y.

(*Continued*)

Fluid Differential Thermostat.

This type of differential thermostat (Fig. 15) is adapted for use where there are several floors to be controlled independently and conditioned from a central apparatus. The dewpoint member and room member each consist of hermetically sealed chambers filled with air or other fluid under pressure. The air or fluid in either of these members will tend to expand and will increase the pressure, with constant volume, in direct proportion to the increase of temperature. The pressure in the dewpoint member, *B*, is conveyed either directly or proportionately to the diaphragm *E* of the differential thermostat *C*, through the differential relay *D* and connecting tube *H*. The room member *A*, which has an adjustable bulb, *J*, connects through tube *K* to diaphragm *F* of the differential thermostat. The pressures or proportionate pressures in these two elements are thus opposed to each other through the lever *N*. Any unbalancing of pressure operates the valve *G*, which is shown in detail in Fig. 16. So long as the temperature difference between the dewpoint temperature at the apparatus and the room temperature remains constant, the pressures on the diaphragms *E* and *F* will remain balanced and no movement of the valve *G* will take place. If, however, an excess of moist air is admitted to the room, until its temperature is reduced to a point where

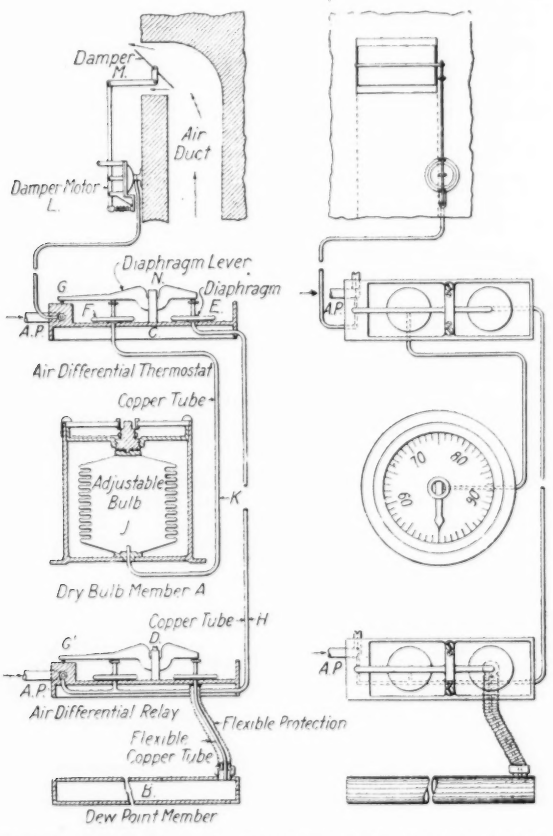


Fig. 15. Fluid Differential Thermostat and Humidity Control.

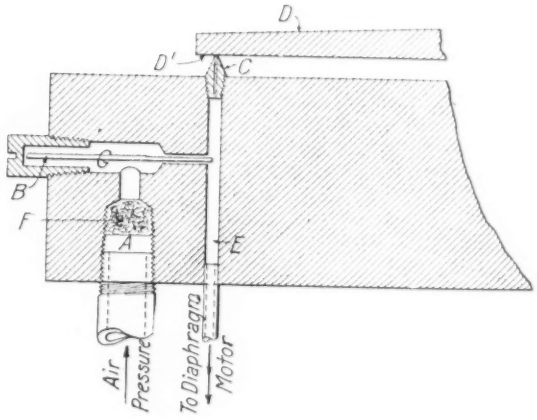


Fig. 16. Construction of Thermostatic Valve.

the difference between it and the dewpoint temperature is less than the predetermined amount, the pressure on the diaphragm *F* will be less than the pressure on diaphragm *E*. This will permit the valve *G* to operate, bringing pressure on damper motor *L* and closing the damper *M*, cutting off the supply of cool moist air.

Adjustable bulb *J*, exposed to the room temperature and provided with a dial, permits the thermostat to be adjusted for any desired difference between dewpoint temperature and room temperature, and consequently for any percentage of relative humidity regardless of variation in room temperature.

The construction of the thermostatic valves *G* and *G'* is shown in Fig. 16. Compressed air is admitted at *A* through filter *F* into the restriction chamber *G*, and also in a constant amount through restriction into chamber *E*, connecting in case of the differential relay with diaphragm *E*, of the differential thermostat, and in case of the differential thermostat, with the diaphragm motor controlling damper *M*. Upon the lower side of the diaphragm lever *D* is a uniformly ground and polished surface *D'* which approaches or recedes from the nozzle *C* as the pressure on one diaphragm overcomes that on the other, increasing or decreasing the pressure in *E* correspondingly.

In many instances the dewpoint system of humidity control cannot be applied to advantage. In such cases a differential hygrostat may be employed. The differential hygrostat (Figs. 17 and 18) consists of two members, one of which is subjected to the dry-bulb temperature of the room, while the other is subjected to the wet-bulb temperature. The expansive dry-bulb member *A*, and the wet-bulb member *A'*,

of hard rubber tube connected by levers F and G operate conjointly the valve lever E. Valve D and restriction B are similar in construction to the valve shown in Fig. 16 and operate in the same way. As will be seen from Figs. 19 and

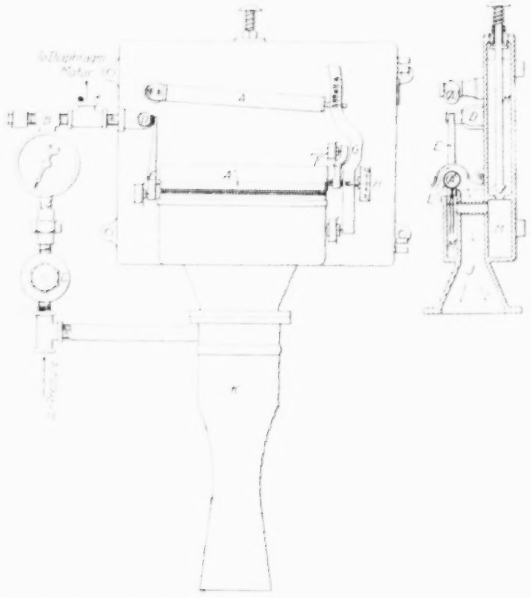


Fig. 17. Sectional View of the Carrier Differential Hygrostat.

20, the difference between the dry and wet-bulb temperature for a given per cent of humidity is not constant at different dry-bulb temperatures, i. e., a constant difference maintained between dry and wet-bulb temperatures would not result in a constant per cent of humidity during this change. For instance, with 50 per cent of humidity at a dry-bulb tem-

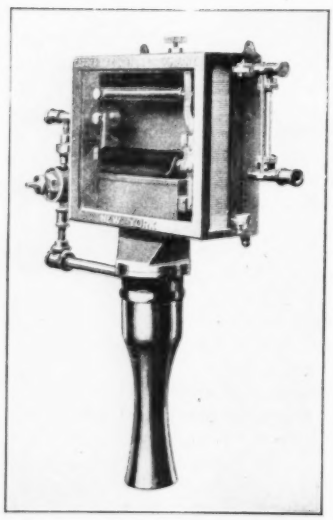
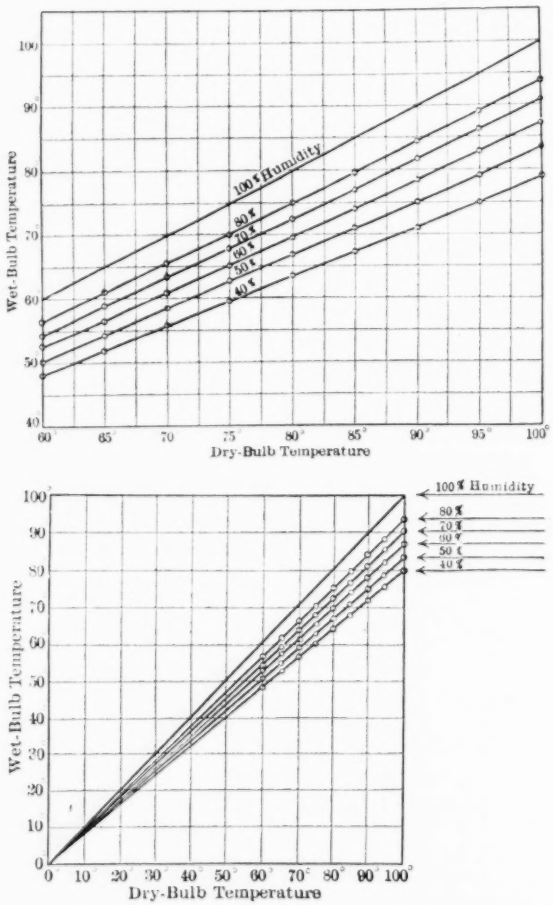


Fig. 18. The Carrier Difierential Hygrostat.

perature of 70 deg. the wet-bulb temperature is 58.42 deg., a difference of 11.58 deg. At 80 deg. the wet-bulb temperature is 66.65 deg., or a difference of 13.35 deg. Thus it will be seen that the dry-bulb temperature has risen 10 deg., while the wet-bulb has risen but 8.23 deg., a difference of 1.77 deg. To compensate for this difference a change of leverage is effected, as indicated by graduations on lever G. An adjustment H permits of regulation to any desired humidity. As shown in sectional view, a wick L' covers A', being moistened by water held in chamber M. A sufficient current of room air is drawn by means of an aspirator K, over A' through chamber J.

An improved form is shown in Fig. 21. It differs essentially in three features: (*a*) the air current is drawn over both expansive members; (*b*) the action of a portion of the expansive member, A, is cut out in the adjustment instead



Figs. 19 and 20. Relation Between Wet and Dry-Bulb Temperature for Different Relative Humidities.

of its action being decreased by a change of leverage; (*c*) the unique feature of this form is that it requires but one adjustment. A differential thread is used, making it a compound adjustment. The pitch of the thread D, in A, is greater than the pitch of the thread on the adjusting screw. As the screw moves along to shorten A, sufficient to compensate for change of difference of dry and wet-bulb temperatures for varying dry-bulb temperature, as shown by graduations A and A' acting conjointly through rocker arm B are carried back, so adjusting lever G, as to maintain the humidity for which the indicator is set.

Vapor Pressure Hygrostat.

Fig. 22 shows an improved form of hygrostat operated by the relative pressures of a volatile liquid subjected to the wet and dry-bulb temperatures. These vapor pressures act

through suitable diaphragms upon a common lever at variable distances from the fulcrum. Referring to Fig. 22, A is the dry-bulb member, A' the wet-bulb member, covered with a wick or absorbent material and moistened by anatomized spray produced by the atomizing nozzle M (Fig. 22, shown

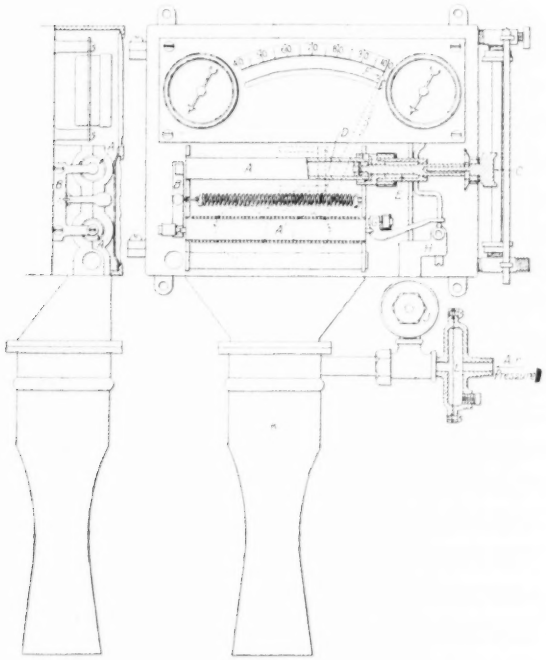


Fig. 21. Improved Form of Carrier Differential Hygrostat.

in detail in Fig. 23). A current of air is drawn over both the dry and wet bulbs by means of the aspirator, as shown in sectional view (Fig. 22). The vapor pressures in these bulbs are conducted to the corresponding diaphragms by

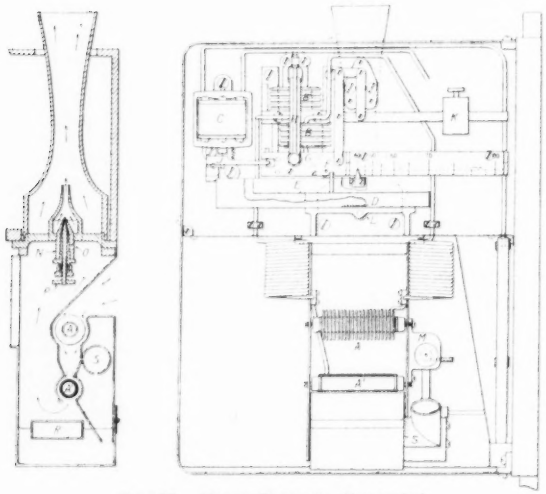


Fig. 22. Vapor Pressure Hygrostat.

means of tubes. Diaphragm B' is connected with the wet bulb A', and the diaphragm B connects with the dry bulb A. The diaphragm B' acts upward on the lever G through the link H, while the diaphragm B acts downward at point G, between the link H and the fulcrum F. Fulcrum F, consists of a hardened steel ball having a rolling contact with the lever G, and the adjusting bar E. The adjusting bar E is moved by a rack and pinion D-L. The scale in per cent of humidity is attached to the lever G, while the pointer is carried on the adjusting bar E and therefore moves proportionally with the fulcrum. Any adjustment of F changes the relative leverage of B and B'; so that by adjustment of it any ratio of leverage may be secured. Any movement of the lever G operates the balanced thermostatic valve C, which controls the source of humidification. The particular fluid

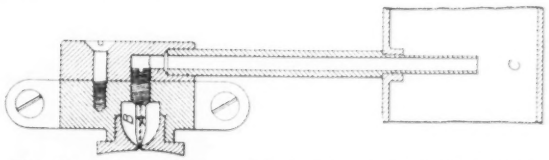


Fig. 23. Construction of Atomizer Used in Carrier Vapor Pressure Hygrostat.

TABLE 3 RELATIVE PRESSURES OF SULPHUR DIOXIDE VAPOR CORRESPONDING TO PSYCHROMETRIC WET AND DRY-BULB TEMPERATURES FOR VARIOUS PERCENTAGES OF HUMIDITY

Dry-Bulb Temperature, Deg. Fahr.	50 Per Cent				60 Per Cent				70 Per Cent				80 Per Cent			
	SO_2 Pressure (Gage)	Wet-Bulb Temperature, Deg. Fahr.	SO_2 Pressure (Gage)	Ratio of Pressures $\frac{P}{P+2.75}$ Lb.	Wet-Bulb Temperature, Deg. Fahr.	SO_2 Pressure (Gage)	Ratio of Pressures $\frac{P}{P+2.75}$ Lb.		Wet-Bulb Temperature, Deg. Fahr.	SO_2 Pressure (Gage)	Ratio of Pressures $\frac{P}{P+2.75}$ Lb.		Wet-Bulb Temperature, Deg. Fahr.	SO_2 Pressure (Gage)	Ratio of Pressures $\frac{P}{P+2.75}$ Lb.	
60	26.28	50.24	18.90	0.6863	52.28	20.35	0.7479		54.30	21.80	0.8096		56.28	23.30	0.8733	
65	30.50	54.32	21.85	0.6863	56.54	23.55	0.7495		58.81	25.35	0.8144		61.05	27.10	0.8775	
70	35.05	58.42	24.95	0.6873	60.86	26.96	0.7489		63.22	28.95	0.8111		65.63	31.05	0.8761	
75	39.94	62.53	28.35	0.6883	65.22	30.65	0.7502		67.80	33.00	0.8134		70.34	35.35	0.8788	
80	45.20	66.65	31.95	0.6878	69.58	34.60	0.7503		72.39	37.35	0.8151		75.07	39.95	0.8762	
85	50.84	70.72	35.75	0.6862	73.95	38.85	0.7507		77.00	41.95	0.8151		79.72	44.85	0.8754	
90	56.87	74.89	39.80	0.6846	78.32	43.35	0.7502		81.61	46.90	0.8158		84.50	50.15	0.8758	
95	63.32	79.01	44.15	0.6835	82.72	48.20	0.7503		86.04	52.05	0.8139		89.21	55.85	0.8767	
100	70.20	83.33	48.80	0.6827	87.07	53.20	0.7479		90.64	57.65	0.8139		94.08	61.95	0.8777	

adapted for use in this type of instrument is sulphur dioxide, the temperature pressure properties of which are remarkably adapted to this purpose, as shown in Table 3 and Fig. 24. The ratio of sulphur dioxide pressures corresponding to wet and dry-bulb temperatures is substantially constant at any per

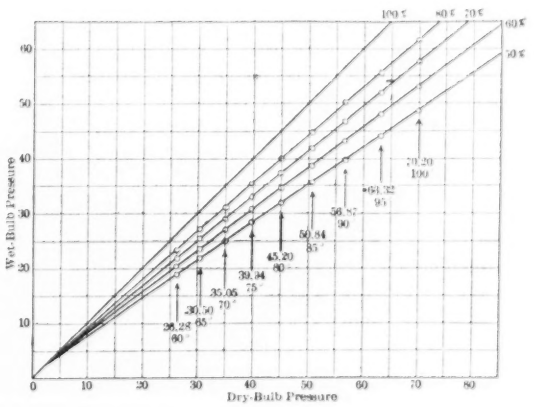


Fig. 24. Psychrometric Wet and Dry-Bulb Temperatures for Various Percentages of Humidity.

cent of humidity for any range of dry-bulb temperatures between 60 and 100 deg. This makes it possible to oppose the pressures at any desired ratio corresponding to the required per cent of humidity, where it will control throughout any range of dry-bulb temperatures.

(To be continued.)

The Shopkeeper vs. the Merchant

Blunders of Inefficient Methods in the Plumbing Business Should Be an Object Lesson for the Plumbing Industry of To-day

By "The Deacon"

Dating back about fifteen years ago, the margin of profit made in the plumbing and heating business was considered very good. It was good at that time, and men in the business were not only capable of coming out whole on a job but would lay aside a comfortable amount. That it was a good paying business became universally known and every one that could went into it, thinking they were going to coin barrels of money. Hence as time went by it became sort of a by-word handed from mouth to mouth, that the plumber and fitter was a robber and made exorbitant profits.

Those who are in the business, of course, know that this, today, is anything but true, but, nevertheless, the fact remains that the public still retain this feeling.

The prices on plumbing and fitting are questioned more than any other bids in the building line. In considering the specifications of a new building, the owner or contractor will get from one to two or possibly three bids on the plastering, decorating, foundation, etc. When it comes to the plumbing and heating he obtains about five, hoping to catch some "robber" asleep and get a low bid, which he generally succeeds in doing.

One great obstacle we have to overcome to better our conditions is that of gaining the confidence of the public. As a whole, we can hardly blame them for calling us robbers and a false lot, because of the manner in which a large percentage of the shops are manipulated. They cannot consistently believe otherwise. A little explanation will prove that the foregoing is correct, not saying that these conditions exist in every shop—but in a large majority of them. You can enter a man's place of business and ask the price of, for example, a bath-tub he has displayed. He will quote you a price of twenty-two dollars. A couple of days later you can go into the same shop and ask the bookkeeper for a price and he will say twenty-five dollars. A friend of yours goes in and is given a price of twenty-seven. By this time you get suspicious and visit one or two other shops, getting prices ranging from two to ten dollars apart. Your conclusion is that some one is either trying to hold you up or else they don't know the cost of the article themselves and are only guessing.

On the other hand you can go into seven or eight hardware, drug or grocery stores, or even call up or write the jobbers in our line and see how many quote you the same prices. If there are any variations, see how closely they run. It will surprise you when tried out. The reason for this is because we have no set prices, no regulation of percentage to add and are doing too much guessing. Lavatories, closets and tubs are put in the show room with no attempt to tag and price them. Every one connected with the office quotes as he sees fit.

Again, there are some who do not seem over-anxious to give prices to a prospective buyer and will say, "O, that lavatory costs about ten dollars, but we will have to install it for you, so will give an estimate on the job." Do you have to put it in for him? Has he not just as much right to buy a lavatory as you have to go to a hardware store and buy a light of glass or electric wiring without their insisting upon putting it in? There is many a striving family that would like to purchase, for instance, a tub for the convenience of a good bath, heating water for it in pails on the stove and draining it off with a hose, until they can save money enough to have it connected. But no! When a man wants to buy a stop cock or a piece of lead, you start to question him, trying to find out what he is going to do with it. You want to ascertain whether he is going to do a job of plumbing himself, and the result is he leaves your place disgusted with your methods as a business man.

Go into a carpenter shop or a lumber yard and they are glad to see you. Purchase a door or some lumber—as little or as much as you desire—and there will be no questions asked as to your intentions.

The average man in our employ does not work for our customers' interests the way he should, as their interests are our interests. In placing an order to have some work done at his residence, a customer feels that he is entitled to the services of a mechanic who thoroughly understands his business; one who will do a first class job, is neat, saving of material and has the customer's interest at heart. For this he is willing to pay.

The public has been imposed upon. Incompetent men working for small wages have been put on jobs, for which the master always charges full price. Because of their lack of knowledge of the business they have made mistakes, had to go over work, used more material than was necessary, put in too much time, etc. Today the plumber or fitter on a repair job is watched as you would watch some one who is trying to do you.

Another serious mistake which is sometimes made in cities where there is a jobbing house, is that of giving a customer an order on a jobber for some article he wants that you do not happen to have in stock. The next time he wants something he is going to try to buy it at wholesale, and eventually he will work in, buying perhaps only small articles, but paying the jobber your profit. No hardware, drug, or in fact any other store, will do this. When they are out of an article they tell the customer they will have it for him at a certain time, thus protecting their interests.

The preceding gives a portion of the reasons which justify the public in having lack of confidence and calling us hold-up artists. We cannot become successful merchants by following that system. We must raise our standard as business men, become merchants instead of "shop-runners," make our stores attractive, aim to do more retailing and not so much installation, and let our by-word be:

In future our aspiration shall be,
To promote our cause materially;
To gain the confidence of the public,
And sell our ware to those who want it.

Motto—Think this over and don't have your business on the wrong side of the ledger.

Michigan Master Plumbers' Annual Convention

Twentieth Meeting of State Association Held at Kalamazoo, March 26-27—Michigan Association Men Royally Entertained in "Celery City"

The entertainment committee of the Kalamazoo Local Association of Master Plumbers, composed of James O'Neill, N. B. Wheeler, Chas. A. Blaney and Fred J. Hotop, was, in a measure, responsible for one of the most successful and beneficial gatherings of the state organization. The entertainments provided by these gentlemen for their guests could not have been improved upon.

At every session held during the convention new ideas of interest to the trade were brought to light and discussed. These new ideas were all of exceptional interest

President-elect Geo. McCullom, of Muskegon.

to the trade, inasmuch as the discussions which followed were entirely for the good of the association and its membership.

The visit to Kalamazoo of the Michigan master plumbers also afforded them an opportunity to visit such manufacturing establishments as that of the Enameled Tank Co. and the Humphrey Mfg. Co. At these establishments the visiting plumbers were shown the different processes of manufacturing articles in which they are vitally interested.

The opening session of the convention was called to order promptly at 10:30 o'clock on Tuesday morning, by President Thos. J. Shields, of Lansing. President Shields introduced to the convention delegates, Chas. A. Blaney, chairman of the Kalamazoo Local Association entertainment committee, and after a few kind words indicating Mr. Blaney's appreciation of the courtesy extended by the Michigan plumbers in coming to Kalamazoo to attend the convention, he introduced Mayor Chas. H. Farrell, who delivered a brief but impressive address of welcome, assuring the visitors that they need not doubt for a minute that the city was theirs. He assured them that they owned everything in sight and that the city was glad to entertain them. President Shields responded to the Mayor's address and stated that the plumbers were glad to be in Kalamazoo, after which he appointed as sergeant-at-arms, Fred J. Hotop, of Kalamazoo, and E. E. Scott, of Saginaw.

The following committees were then appointed:

Credentials committee.—Otto A. Wurm, Detroit; Geo. A. Van Landegend, Holland.

Auditing committee.—F. J. Slooter, Grand Rapids; Edward Mack, Lansing.

Resolutions and Press committee.—C. P. Tietze, Detroit; L. A. Nowlin, Jackson; Andrew Muir, Grand Rapids.

President Shields appointed as reading clerk, C. K. Nichols, of Bay City.

Before settling to the routine business of the associa-

C. P. Tietze, of Detroit, Outlined the Work of the Resolutions Committee.

tion, President Shields introduced D. H. Roberts, of Cleveland, a member of the board of directors of the National Association of Master Plumbers, who represented that organization at this convention at the request of National President Eynon, and who conveyed to the Michigan master plumbers greetings and best wishes from the officers of the national organization. Mr. Roberts briefly stated his pleasure in being able to participate in gatherings of this kind and also referred to the necessity of the closest harmony between the national and state organizations. He also advised the Michigan master plumbers

of the fact that the plumbing industry throughout the United States is now beginning to feel the actual benefits of organization work, and that the plumber of today is more conversant with the question of his rightful percentage of profit than he has ever been before. Mr. Roberts' remarks were heartily applauded by the convention delegates.

The report of the committee on credentials was read by chairman Otto A. Wurm, and this report was referred back to the committee for corrections on a motion which was made and carried.

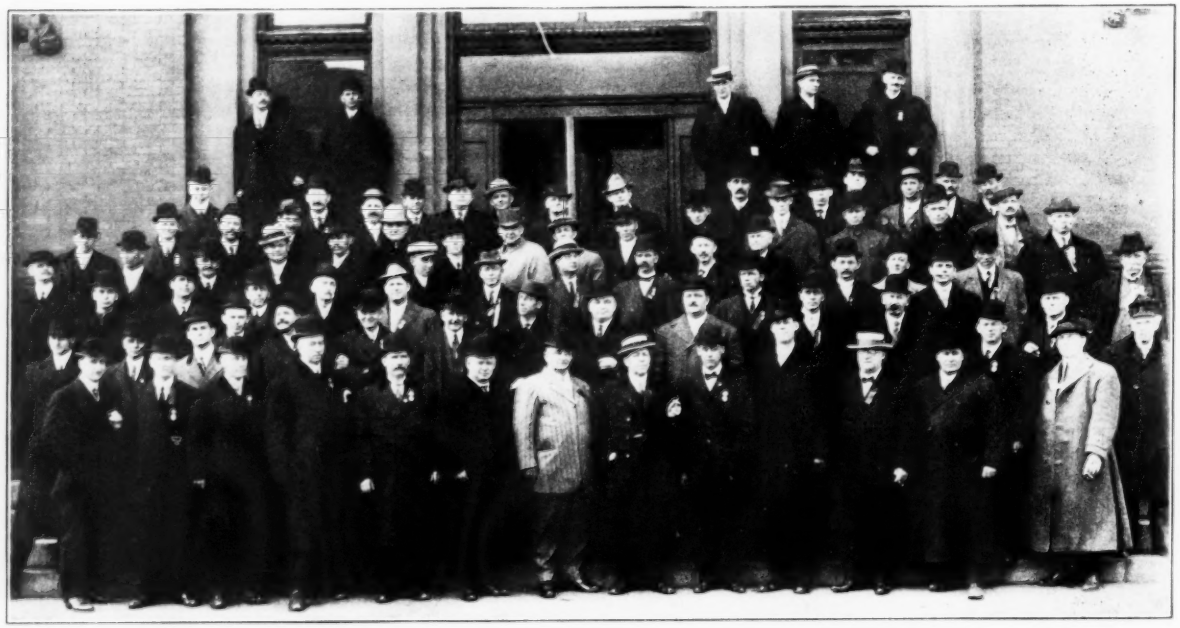
Reading clerk Nichols, was then asked to read the treasurer's report. This report was referred to the auditing committee. President Shields then informed the delegates that the association's official representative, Mr. C. H. Morgan, of Detroit, at the last annual meeting of the National Association of Master Plumbers which was held in Galveston, Texas, June 13-16, 1911, had prepared a report of that meeting and of the trip to Galveston and return, and that Mr. Morgan's report would be read by the reading clerk. Mr. Morgan's report was highly appreciated by the delegates and after its reading he was extended a rising vote of thanks.

A number of suggestions were suggested as being available for the consideration of the resolutions committee. These resolutions covered several different topics and after discussion were referred to the committee for action. The convention then adjourned until 9 o'clock on Wednesday morning.

During the afternoon the delegates visited the plant of the Bryant Paper Mills, being escorted to that institution by the entertainment committee of the Kalamazoo Local association.

Banquet.

The association's banquet was held in the banquet room of the New Burdick hotel, and this affair was one of the most enjoyable in the association's history. C. H. Morgan was toast-master and after a most excellent menu had been partaken of, Toast-Master Morgan introduced such well-known speakers in the plumbing industry as J. J. Cosgrove, of Philadelphia, Adolph Mueller, of Decatur, Ill.; W. E. Clow, Jr., of Chicago; D. H. Roberts, of Cleveland, and others. Mr. Morgan paid a high tribute to the city of Kalamazoo and the members of the plumbing fraternity who are engaged in the business in that city. Mr. Morgan also referred to the fact that it had been twelve years since a former meeting of the state association was held in that city. This brought to light the fact that there were present at this banquet but twelve of the organization's members who had attended the previous convention of the association held in the same city. A pen sketch of James Meath, father of the Michigan state association, was presented to the Detroit association by the Kalamazoo Local organization. After a number of interesting after dinner talks, the guests of the evening were entertained by vaudeville performance from a local theatre. This part of the evening's entertainment was highly appreciated.



Michigan Master Plumbers as They Appeared in Kalamazoo.

Wednesday Morning's Session.

The Wednesday morning's session of the convention was opened at 10 o'clock with the reading of an essay on "Confidence" by L. J. Butler, of Grand Rapids. Mr. Butler was extended a vote of thanks for his essay. The report of the auditing committee was then read and accepted, and this report included the report of the treasurer. The auditing committee was then discharged.

Secretary's Report.

Secretary Decker read his annual report for the fiscal year.

To the Michigan State Association of Master Plumbers:

As your Secretary for the fiscal year 1911-1912, I beg to submit my report as follows:

General business in our trade has been good in the State during the past year as regards volume, and in some localities fair as to prices received for the work done, but in some cities in general and in other places to a limited extent a large amount of work is done at ruinous prices (ruinous to the plumbers), or at prices allowing the plumber a bare living, for a large volume of work performed.

I am pleased to report, however, that in many places and to a certain extent in most places, the able and instructive black board illustrations and lectures on operating cost of doing business, presented at our Jackson and Muskegon conventions, by Mr. S. H. Morgan, is bearing fruit, and that many members are applying the lesson in the conduct of their business.

Many printed copies of the lecture and tables, have been

Secretary Decker in Action.

sent out to our members from my office and are found on the desks of various members in the state showing that some at least have been awakened to the extent to cause them to sit up and take notice.

In all cases where this knowledge is being applied, it is a pleasure to note that there is general improvement in the business conditions, by causing the members to get some-

C. G. Jewett, of Howell, Never Misses a Convention.

where near a decent living price for their work. They are thus enabled, and are doing a better grade of work, and are having better satisfied customers, than at the old low prices and poor work which is the inevitable result.

The mail order houses have not gained any headway in this state, in our line, and according to my observation and reports received by me, their success has really decreased during the past year.

If it were not for the so-called plumbers in the small towns and a few unthinking ones in the larger cities, who are foolish enough to install these goods, this annoyance would practically disappear.

On the matter of trade protection I am pleased to report a very satisfactory condition throughout this state and section of the country, and I believe we have had better trade protection since the abrogation of our "Trade Protection" by-laws at the National Convention at Detroit, than we did before.

The manufacturers and jobbers are showing a decided disposition to co-operate, by voluntarily refusing to quote or sell direct to the consumer and to recognize that it is just, and both morally and legally right to give us the trade protection, which is so essential to our business and to which we are so justly entitled.

The few manufacturers and jobbers who refuse to ob-

Otto A. Wurm, of Detroit, Mapped Out a Program.

serve the principle of trade protection, and who are in reality retailers and our competitors, would soon go out of business, or be rightly classed as retailers, if the plumbers would simply refuse to buy from these pirates, and thus apply the just law of self protection, of which no law or statute can ever successfully or permanently rob us.

When we complain to the manufacturer that these houses are not legitimate jobbers and therefore not entitled to jobbers' prices, the manufacturer promptly tells us that when the plumbers stop patronizing these concerns, and thereby recognizing them as jobbers, then the manufacturers will be compelled to act accordingly.

In my judgment the mail order house is angelic, compared to the above mentioned class of so-called jobbers, who are "Wolves in Sheep's Clothing" while the mail order house is legitimate and works in an open and aboveboard manner instead of sailing under false cover as these illigitimate, pirate jobbers do.

Many members who buy from these jobbers, are the men who find fault with and blame the association and its officers for the infractions of the principle of trade

protection, when it is their action in buying from them that keeps these jobbers alive.

To the above should be added the men in the business, who should be, but are not members of our Association, and are invariably heavy buyers of these concerns that are doing many of the things that tend to undermine our business.

The foregoing remarks are the result of my observation as your active executive officer for the past three years, and the question that I would ask you is; How much longer are you going to encourage and patronize these pirates, and continue to "Cast your pearls before the swine?"

N. B. Wheeler, of the Kalamazoo Entertainment Committee.

Several complaints have been received during the past year, and I am pleased to report that with few exceptions these together with the complaints on file at our Muskegon meeting, have been amicably adjusted.

There have been a few cases of internal squabbles in our locals, and in most cases these have been adjusted and the "Dove of Peace" again reigns in these places.

Two cases of this kind of very recent date are still unsettled, but I do not anticipate any difficulty in effecting an adjustment by personal visit, by your new Secretary, as practically all these cases are the result of petty differences and the lack of broadmindedness on the part of the members, and lack of tact on the part of the officers.

I have visited as many locals and prospects as my time and your limited financial resources would permit, and have always tried to respond promptly when called upon for assistance, or council.

The Upper Peninsula is in need of some active work and our Association can be materially strengthened in that territory, as soon as time and the necessary finance are available.

What the Upper Peninsula needs and must have, in order to maintain a good lasting organization, is some good live energetic officers or sub-officers located in that section, who will be in charge, with funds with which to defray their expenses, etc., and I would suggest that some action be taken at this meeting, on this matter.

In closing, I wish to thank the officers and members for their support and co-operation, and to suggest that the most helpful thing you can do, is to give to us at this time, your friendly criticism and suggestions, for the guidance of your new officers.

Respectfully submitted,
(Signed) W. A. Decker,
Sec'y.

Mr. Decker's report was accepted and ordered entered in the records.

Secretary Decker then introduced to the delegates a detailed outline of the relationship between the Michigan Retail Federation and all commercial organizations. After considerable discussion of this proposition, the matter was referred to the board of directors.

The corrected report of the credentials committee was then read and the report was accepted. Report of the committee on resolutions was read by Chairman C. P. Tietze, and after a number of discussions of resolutions recommended, the report was accepted. The discussion of the sentiment of the organization on the question of the proper purchase of materials and the relative discounts, was led by Norman Boosey, of Detroit.

Secretary Decker then urged the members of the Michigan Master Plumbers' Association to seek to eliminate the sub-contractor.

Mr. Morgan, of Detroit, made an appeal to the members of the organization to stand by their own prices and refuse to be "buncoed" by architects and general contractors.

Secretary Decker read a communication received from the Master Sheet Metal Association, of Kalamazoo, after which the convention went into executive session.

Afternoon Session.

At the afternoon session a recommendation was made that the organization become affiliated with the Michigan Retailers Federation. This recommendation, however, was afterwards referred to the in-coming secretary by the board of directors. The recommendation was concurred with by a vote of the delegates.

Geo. McCullom Was Handed the Presidency.

Secretary Decker elucidated the need of more direct promotion for the plumbing trade. Many matters of interest in this connection were discussed, and actions taken by the secretary during the past year were highly commended by Chas. G. Jewett, of Howell. During the discussion of various points of interest in this connection, Otto Wurm, of Detroit, very gracefully presented the Detroit master plumbers' viewpoint.

This was followed by discussions of various matters pertaining to the organization's finances and its financial standing of the present date. All these matters were successfully and agreeably disposed of.

Election of Officers.

Geo. McCullom of Muskegon was elected president by a unanimous choice. Mr. McCullom very gracefully accepted the election with a request for the absolute co-operation of the membership and officers.

James O'Neill, popular president of the Kalamazoo Local, was elected vice-president by unanimous choice. Mr. O'Neill was conducted to the vice-president's chair and introduced to the convention as one of the most aggressive members of the organization.

Mr. Morgan of Detroit placed in nomination for secretary-treasurer Wm. A. Decker of Grand Rapids, and Mr. Decker was re-elected for a term of three years.

C. H. Morgan of Detroit was again elected delegate to the National Association convention, which is to be held at Salt Lake City in July. W. W. Wood of Detroit was elected alternate delegate to the National Association convention.

The city of Saginaw was selected as the next meeting place of the association.

A vote of thanks was extended to the Kalamazoo Local for the entertainment provided, and to the local and trade press and citizens of Kalamazoo for their co-operation in making the master plumbers' twentieth annual convention successful. The convention then adjourned sine die.

Delegates in Attendance.

Allegan: I. A. Brown Co.

Bay City: T. E. Smith, W. A. Hyland, C. R. Nichols.

Detroit: S. H. Morgan, Benj. Oakes, Alex Maxwell, Ernest Wenzell, E. P. Steiner, Wm. F. Blum, Otto Goetsch, Wm. Mesbach, P. J. Youngblood, Frank Krug, Sam Graham, Thos. Yurkovitz, A. Hassig, H. J. May, Wm. Gourlay, John Pfromm, Otto A. Wurm, J. E. Lee, Wm. Hughes, Chas. Brann, W. W. Wood, Norman Boosey, Jas. R. Bolton, C. P. Tietze.

Flint: Geo. H. Holmes, Geo. W. Larkin, Ames & Church, Clarence Tyler, T. J. Shields, A. Renker, Edw. Mack, J. G. Gross.

Grand Rapids: Joseph Van Rossum, S. A. Swart, J. J. Vander Meer, L. J. Butler, F. J. Slooter, John Bros., Henry N. Thompson, Henry Bouma, Benj. Powett, R. R. Heth, C. Van Rossum, A. A. Muir, E. L. Norman, M. O. Patrey, F. H. Youngs, C. A. Scheufler, Wm. Praetonius, T. J. Hunter, Henry B. Strubs, L. H. Semeyn, Geo. Thompson, Otto Bettin, Wm. O. Cargill, Chas. Qisein, M. Probst, Jos. B. Lang, W. A. Decker, Wm. F. McGuirrin, Wm. Pults. W. P. Hammer.

Howell: C. G. Jewett.

Holland: Geo. A. Van Landegend, Henry Keoker.

Jackson: Arthur Pickles, L. A. Howlin, J. J. Keeley, Howard Reid.

Kalamazoo: J. A. O'Neil, H. J. Youngs, W. P. Rix, Chas. Blaney, Norbid Wheeler, J. C. Wall, Peter Schuur, Harry Vandepoolder, Fred Herman, Peter De Young, Geo. De Kam, Peter Van Peenan, Steven Radiker, James Harkins, Fred Hotop, Tom Bartlett.

Muskegon: Geo. McCollum, A. Hunter, Jas. Coyne, L. W. McFadden, A. Simpson, E. Krueger.

Saginaw: W. A. Brown, E. E. Scott, J. H. McKenzie, Wm. C. Richter, W. K. Wright, Geo. Gartner, E. V. Merrill.

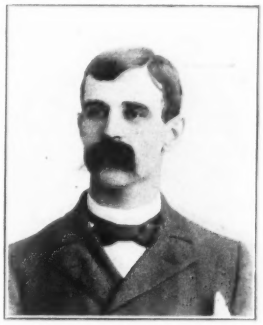
Traverse City: R. J. Mercer.

Ypsilanti: O. A. Kawkinson, D. B. Waterman.

NEW PLUMBING TRAINING TRADE SCHOOL ESTABLISHED.

E. E. Scott, of Saginaw, Mich., recently established a trade school for the teaching of plumbing, steam and hot water heating, at 1201-1203 S. Washington Street, Saginaw. Mr. Scott has provided his school with a building containing ample room for all practical teaching purposes, and this building will also be used for the practical training work of the students.

Mr. Scott's experience in the plumbing and heating trades covers a period of thirty-three years, and in stating his purpose in establishing this training school, he recently said: "Progress is drawing young and ambitious men to the training schools throughout the world as the shortest time and most competent way of learning a trade. The old way of learning a trade is now recognized as being absolutely inefficient. In most instances the men who have learned their trades by the old-time and long-time apprenticeship, are not as competent as the progressive man who learns in the progressive way at a practical and technical trade school. The demand for competent plumbers is, and has been, greater than the



E. E. Scott, of Saginaw.

supply. Plumbing is an art which the people cannot get along without, and the better and more sanitary it is made for the ultimate benefit of humanity, the more it is being appreciated. In order to reach this standard we must have competent mechanics and more of them. The so-called "dub" of the plumbing and heating trades is losing his grip as a result of progressiveness. The more competent mechanics in the trade, and the scientific men of the world, are recognizing the importance of more stringent laws governing and requiring sanitary plumbing in our municipalities. The state and city boards of health are very much in favor of laws and rules governing the requirements for sanitary and efficient methods in plumbing and heating trades. Progress in these lines will eventually eliminate the inefficient mechanic. The mechanic must either keep pace with progress or be eliminated. Recognizing this progress from my actual experience with incompetent mechanics, has caused me to establish my school. I have long known that an apprentice who serves an apprenticeship of from three to five years, gets very little instruction from the master or journeyman plumber. Under my plan the instruction will come with each piece of work the student does and will be reviewed so often while acquiring the practical part, that by the time he is able to bring his work to a high standard of efficiency, he will be competent to explain both the theory and practice of his accomplishment."

Chicago, Ill.—Purves Heating Co. has moved its business from 207 South Fifth Ave. to 521 West Monroe St., where it has secured larger and more commodious quarters.

Solder, How It Is Mixed and Tested*

By W. A. Bradford, Instructor in Plumbing at the Trade School of Massachusetts Charitable Mechanics Association, Boston, Mass.

In writing this article no claim is made for any new or original ideas; it is simply to verify those already in existence, and an attempt to explain to the student any point on which he may be in doubt. In all trades—and plumbing especially—it seems to be the desire of a certain class of journeymen to try and surround it with as much mystery as possible. Whether this is done with the desire of preventing young men from learning, or with the idea that they possess something no other person can learn, would be difficult to decide—it certainly should not be the latter. No one knows it all, and rarely does one person possess information which others may not obtain, providing they are willing to spend the time in work and study necessary to obtain it.

In the founding of trade schools it has been one of the chief aims of the founders, not only to provide a place where a boy may be taught to work with his hands, but to try and explain to him why certain things are done in that particular manner.

There can be no effect without a cause, and the student or boy who would become proficient in his trade should not only know how to work with his hands, but with his head as well. Both should be taught or trained to work in unison. But we must return to the subject in which we are to explain the composition of solder and its uses:

Definition.—The word solder is from the Latin word, solido, meaning to make firm by joining together, or the word solidus, to make solid.

If we were to look in a dictionary for a definition of solder we would probably find an answer similar to the following: "An alloy of different metals used to join the adjacent edges of two pieces of metal together (by soldering)" or "a metallic cement used to join metals together." While these might answer as a definition, the following answer would be more explicit:

An alloy of two or more metals which when heated to its fusing point will adhere to the cleaned surfaces of other metals, which are fusible at a higher degree of heat. It should always be borne in mind that the solder should have a lower fusing or melting point than the metal on which it is to be used, otherwise there would be a certainty of melting the metal on which the work was being performed.

Uses of Solder.

Solder is used in the plumbing business for joining lead, brass, tin, and copper pipes, and thin rolled sheets of the same materials together, by means of wiped joints, or joints made with a copper soldering iron.

Different Kinds of Solder.

There are two kinds of solder common to the trade, known as hard and soft solder. Soft solder is the one used principally in the plumbing business. Hard solder fuses at so high a temperature that it is of no practical use in ordinary plumbing. It is used principally for brazing, and is commonly called spelter solder.

The metals chiefly used in making soft solders for use in the plumbing business, are lead and tin. Bismuth is sometimes used when it is desired to use a solder which will melt at a very low temperature.

Lead.—Lead is from the Latin word plumbum (symbol Pb.). It is of doubtful native origin, but is obtained from lead sulphide (Galena) principally. It is bluish-grey in color, and very soft, being easily scratched with the nail, and produces a soft black mark when rubbed on paper. It is slightly ductile and possesses very little tensile strength. Some of the products of this metal, produced during the course of reduction, are antimony, copper and silver. It is very malleable, and fuses at about 618 deg. Specific gravity 11.49. A large proportion of the lead used in this country is produced from the mines of Colorado (Leadville, Col.). Lead is one of the most anciently known metals.

Tin.—Tin, symbol (Sn.) from the Latin word Stannum. It is reduced from the ore, tin stone. It is a metal of bright metallic lustre, silver white in color. It is quite ductile, being rolled or beaten into thin sheets (tin foil). Its tensile strength is greater than that of lead, but it is not so malleable. Tin fuses at about 448 deg. F. Specific gravity 7.28. The peculiar sound produced by bending the tin is due to the molecular disturbance of its composition, and is called the cry or crack of the tin. Tin is obtained principally from the mines of Cornwall and Devon. Tin is plentiful in the Black Hills of South Dakota, but is not worked much on account of the difficulty of obtaining the metal from its ore.

Composition and Mixing of Solder.

Most of the solder used by the trade to-day comes ready mixed and molded into pigs weighing about four pounds each.

Plumbers' wiping solder is made of about two parts lead, and one part tin, or seven of lead to three of tin. When the lead and tin are mixed together in these proportions they form about the proper alloy for joint wiping, and possess great tenacity and cohesive strength.

In mixing solder only pure pig lead should be used. The lead should be placed in the pot first and heated to its fusing point (about 618 deg.). Care should be taken not to let the lead become too hot or burn. When the lead is all melted the tin should be added, at the same time stirring in a small quantity or rosin or tallow. This forms a flux, prevents oxidation, and aids in the proper mixing or fusing of the two metals together. After the metals are well heated, they should be stirred together well, and the dross removed from the surface of the solder. The temperature of the solder should then be raised to about 700 deg. F. At this temperature it browns a piece of paper quickly, but is not hot enough to ignite it. It should then be poured from the pot into small molds, and allowed to cool. During this process the solder should be stirred occasionally, to prevent the lead from settling to the bottom of the pot. Assuming that you wished to make a batch of 100 lb. of solder, the proper proportions would be 65 lb. of lead and 35 lb. of tin. Solder mixed in this proportion would have a fusing point of about 440 deg. F., about 8 deg. lower than the

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fusing point of tin. It will be found in working this mixture that the solder will be a little fine; this may be remedied by adding a little lead to the mixture. In adding lead to the mixture to make it coarse, care should be taken to use only fine pig lead or new lead supply pipe. Never use old lead pipe, or new lead waste pipe, as there is a certain percentage of old lead and sometimes zinc added to the pig lead in making waste pipe. The old lead and zinc are added to impart stiffness or rigidity to the pipe, and would be detrimental if used to any extent in the solder.

Testing.

The test for wiping solder to see if it is mixed in the proper proportion, is to pour several lots of the molten metal from the ladle onto a clean brick or slab, forming pieces about the size of a silver dollar; allow these to cool thoroughly before moving. Good solder after cooling should show a mottled appearance on the top surface. This is due to the separation of the tin and lead in cooling. If the solder is mixed in the proper proportions it should show about five bright or shining spots to the square inch. If it shows many more than this it is too fine. If the top surface of these pieces show a whitish-grey appearance, it is an indication that the solder is too coarse, and more tin should be added.

While these tests are reliable to one who is experienced in handling solder, a better and surer way for the novice or beginner to test his solder would be to take a piece of lead pipe and proceed to wipe a joint on it with some of the solder he was testing.

In working the solder in this way if it sticks to the wiping cloth, cools or sets quickly at the edges of the joint, runs or drops from the bottom of the joint after it is finished, it would indicate that the solder was too fine, and a small amount of lead should be added to the solder. If the solder cools too quickly, breaks or cracks off the joints in chunks, has a coarse or granular appearance, will not work smoothly or adhere to the pipe, assumes a white or grey color in cooling, it is too coarse, and a small amount of tin should be added to the solder.

Solder that has become dirty or contains zinc will not work properly. It will not adhere or cling to the pipe in wiping the joint, and in cooling assumes a dirty, whitish appearance. When zinc is present in solder it will appear in small lumps during the process of wiping the joint. These lumps of zinc set or cool quickly, while the rest of the solder remains in a plastic state a proper length of time. If you try to rewipe the joint, you will find it quite difficult to melt these lumps of zinc from the pipe without raising the temperature of the solder to a very high degree. This is due to the fact that while zinc was in alloy with the tin and lead of the solder it had a lower fusing point, but when once separated from the solder it returns to its natural state and fusing point (about 770 deg. F.) while that of the solder is about 440 deg. F. It would be necessary to raise the temperature of the solder to about 800 deg. F. before the zinc could be melted from the pipe.

It is detrimental to solder to heat it to this high degree, as it burns or volatilizes the tin, causes the lead to oxidize and rise to the surface of the solder in the form of a thick dross. When bismuth is present in alloy with the solder it acts similarly to the zinc, the only difference being that the bismuth has a lower fusing or melting point (580 deg. F.) than the zinc, consequently it would not be necessary to raise the solder to so high a temperature to cause the bismuth to melt and again alloy with the solder.

Solder which has become dirty or contains zinc or bismuth should be cleaned or burnt out.

The question is frequently asked how zinc, copper or bismuth gets into the solder.

Presence of Zinc, Copper, or Bismuth in Solder.

It will be necessary to answer each of the above questions separately, so we will take them in their order, beginning with zinc. The metal which we commonly refer to as brass is an alloy, and is not a native metal. If it is honestly and properly made or mixed it contains about 66 parts copper and 34 parts zinc. In plumbing, brass enters frequently into the system of piping in the form of brass pipe, stops, faucets, ferrules, solder nipples, etc., and it is oftimes necessary to join lead to brass by wiped joints. In preparing the brass pieces for wiping it is necessary to remove the outside surface of the brass by filing until the bright surface of the brass is exposed. These brass filings lie on the bench at which the wiping is being done, and in gathering up the superfluous solder after the joint is finished, some of the brass filings become mixed with it, and are thrown into the pot of solder. The zinc contained in the brass readily melts and mixes with solder. This is one of the common causes of zinc getting into the solder, and is done quite frequently unconsciously by the workman. Brass should never be filed when solder is being used, unless due caution is exercised.

A frequent cause of zinc in solder is from wiping joints on brass, especially the cheaper grades of brass, such as ferrules, nipples, cheap stops, faucets, etc. The percentage of copper in a cheap grade of brass is very small, and that of zinc very large, thus by frequent wiping on brass of poor quality, the solder soon becomes dirty or lumpy, assuming a whitish, mottled appearance when cool similar to the surface of galvanized iron. The coating of galvanizing on sheet iron, iron castings, etc., is produced by dipping the metal which has been previously cleaned into a hot bath of zinc.

Care should be taken in wiping joints on brass not to raise the temperature of the solder or brass too high, as the zinc will separate from the brass by fusion, and alloy with the tin.

When the brass on which work is being done assumes a dark or black appearance, it is an indication that the metal has been overheated. The solder refuses to stick to it, as the tinning has been burnt off. The change of color is due to the melting of the zinc in the brass, which causes it to oxidize and turn black.

Care should be taken in using wiping solder around galvanized iron; it is better to use the soldering iron on this class of work. Any old solder that has been melted from galvanized iron should be thrown away; it is cheaper than trying to use it, and spoil a pot of good solder by mixing the two together.

It is claimed by some that zinc is used in the manufacture of lead pipe to harden the lead, but there is a question of doubt about this; yet the writer has often noticed that solder that was apparently working all right, would suddenly become lumpy, and the solder could not be properly worked; lumps would form in the solder or joint, which could not be melted again without raising the solder to a very high heat. These lumps are particularly noticeable when the wiping is being done on lead pipe, and a portion of the pipe was burned during the process of wiping. Upon examination these lumps were found to contain a large percentage of zinc.

Sometimes solder will work all right for a few heats, after which it is almost impossible to do any wiping with it. This is due often to the poor quality of tin used. The presence of copper in solder is due oftentimes to the poor quality of tin used in its composition. Copper is a by-product of the tin, it being separated during the reduction of the tin from the ore.

Copper is frequently noticed in cheap solder or composition solder which has been made from old joints; one experienced can detect its presence by the glint of the copper on the top side of the pig or stick of solder after it has been cooled in the mold.

We frequently hear of bismuth being used in solder to adulterate it, but with bismuth at $2.50 per lb., tin at 40 cts. and lead at 6 cts. per lb., there is small probability of any being used except by accident.

Antimony is sometimes used in the manufacture of cheap solder to adulterate it. It has a high fusing point, about 842 deg. F., specific gravity of 6.78, and a commercial value of about 8½ cts. per lb. Its high fusing point would be prohibitive if it were not for the fact that it readily alloys with the tin of the solder, which renders it more fusible. It is readily detected when it separates from the tin of the solder, as it forms in lumps, and when once separated cannot again be melted without raising the temperature of the solder to the fusing point of the antimony. It is of a bluish-grey appearance. A single pound of antimony will cheapen one hundred pounds of solder from two to three dollars, and yet the solder will have the appearance of a plentiful amount of tin in it. The antimony imparts the shiny appearance of tin to the solder when used to adulterate it.

Cleaning Solder.

Solder that has become dirty, is gritty, shows a zinc appearance when cool, and will not work properly, should be burned or cleaned out in the following manner: Heat the solder to a dull red heat; while it is at this heat stir into the solder a small ladle full of powdered sulphur, into which has been mixed a small quantity of powdered resin. This mixture should be thoroughly stirred into the solder. If the solder contains any zinc it will mix with the sulphur and rise to the surface in the form of dross. If the solder contains dirt, it will also rise to the surface with the dross, or burn away. The pot should then be cleaned of all dross. Where it is necessary to burn out solder often, a separate pot and ladle should be used from the regular working pot, as it makes rather a dirty mess of them. After solder has been burnt out it usually requires a small quantity of tin before using, as a portion of the tin is burned away owing to the hig heat (about 800 deg.) to which it was necessary to heat the solder previous to burning out. When solder is only dirty, it can be benefited by mixing a small quantity of resin with it, and stirring up the solder thoroughly. The solder should be hot enough to ignite the resin, as the dirt and resin will burn out together.

Tinning.

An important factor in making tight joints when metals of different or like kinds are to be joined together by wiped or soldered joints, is the proper tinning of the metals before work is begun on the joints.

The word tinning, as applied to the plumbing trade, means to cover the surface which is to be soldered with a coat of tinning so the solder will adhere readily to the surfaces which are to be joined together. In using the terms to tin, tinning or tinned, it does not always mean that the surface of the metal was covered with a coat of pure tin, as fine solder is used more frequently in the operation of tinning metal by plumbers than the pure tin.

Poor tinning of the metal is the cause of many leaky joints, and too much care cannot be exercised in this direction. In making wiped or soldered joints on lead pipe or sheet lead, it is not necessary to tin the metal previous to the operation of soldering.

Nearly all metals when exposed to the air are subject to oxidation or tarnish by exposure, some being more susceptible than others, particularly lead. Therefore, before they can be tinned, this oxidation must be removed from the surface of the metal, either by filing or scraping, in order to present the bright surface of the metal for tinning. After the surface has been brightened it should be rubbed lightly over with tallow to prevent further oxidation, particularly if it is not intended to tin or make the joint on the metal at once.

In all work, such as brazing, soldering or welding, or when metals are to be joined together by heat, it is necessary to use a flux, to prevent oxidation. A flux is a substance used to facilitate the fusion of metals by heat, and prevent oxidation. Palm oil, resin, sperm or tallow candles are suitable fluxes for soldering on lead, brass, tin or copper, and muriatic acid or chloride of zinc for solder work on zinc or wrought iron pipe. Solder work on cast-iron is very uncertain, and should not be attempted by the novice. Chloride of zinc is commonly known to the trade as cut acid, and is made in the following manner: Into the desired quantity of muriatic acid drop small pieces of zinc until it ceases to bubble. When it reaches this state it has all of the zinc in solution it will absorb, and is the right strength for soldering on clean zinc, galvanized iron, tin and wrought iron. When cut acid is used is used to tin metals that are to be joined together by wiped joints (as wrought iron pipe) all superfluous acid should be cleaned from the pipes before wiping is begun, as the acid is absorbed by the wiping cloth, causing it to rot.

On tinning articles such as tail pieces, nipples, etc., particular attention should be given to the ends and edges. They should be thoroughly cleaned and tinned, as oxidation begins at these points, and gradually works back under the tinning, causing it to decompose and the joints to leak.

Spelter solder, or hard solder, is made of zinc and copper, in about the same proportion as soft brass.

Fine solder, or stick solder, is made of one part tin and one part lead. Fusing point, about 380 deg. Fahrenheit. It is too fine for wiping. It is intended for blow-pipe work, and work with copper soldering-irons or bolts.

In conclusion, the following suggestions or hints will not be out of place: Occasionally give the solder a thorough stirring. This will prevent the tin and lead from separating when they are allowed to stand any length of time after using. It should always be remembered that the lead is about 40 per cent heavier than the tin, consequently it will settle to the bottom of the pot unless frequently stirred. Care should be taken not to overheat the solder, as it results in loss of tin by burning. The tin contains the binding properties or richness of the solder, and should not be destroyed. Frequent accumulation of dross at the top of the pot is an indication usually that the solder has been burned, the dross being the result of oxidation by the overheating of the solder.

The required thickness of a joint depends upon the pressure that the joint has got to withstand. Usually a safe rule is to have the joint of solder 1½ times the thickness

of the pipe on which the work is being done. The center of the wipe joint should be made as near as possible to the center of the joint between the two metals which are being joined together. If it comes to one side from this point, it is of no benefit, as it brings the thin part of the wipe joint directly over the union of the two metals. Be careful when wiping on brass not to overheat it, as it will cause the tinning of the metal to be destroyed by burning.

In using paste and paste papers in joint-wiping, do not allow any superfluous paste to accumulate at the edges of the joint which has been previously cleaned, as it will result in a thick edge at this point. Only thin paste papers should be used, and they should pass around the pipe only once with a slight lap where the ends meet.

VALUABLE COMMENTS ON THE PRECEDING ARTICLE ON "SOLDER."

We submitted the above article to A. J. Deniston, vice-president and assistant manager of the Raymond Lead Co., Chicago, who is probably the greatest authority in this country on solder, and he kindly read the article and gave us his valuable criticism, which follows herewith and which we are sure our readers will peruse with great interest:

"We have gone over this interesting article very carefully. It does not quite agree with our ideas on the subject. For instance, plumbers' formula for wiping solder contains 38 parts tin, 62 parts lead, with a small percentage of antimony, which imparts to the solder a cohesive quality.

"While Mr. Bradford does not state positively that the addition of zinc to lead for hardening of pipe is practiced, he rather intimates that this is done. As a rule zinc sells considerably higher than lead. Providing a manufacturer wished to harden lead pipe used for waste, he would not add a metal that cost more than the lead from which the pipe is made.

"The remelting of lead has a tendency to harden it, and a manufacturer always has enough old lead or re-run lead on hand for this purpose. The practice in taking in old lead is to cut off the solder joints, thereby removing the possibility of the scrap lead containing any other metal than the lead itself.

"Providing the author discovered zinc during the process of wiping, the zinc must have become present in the solder through some of the methods he refers to in other parts of his article. However, we have no means of knowing what metal some careless manufacturer might attempt to make his pipe from. You can readily understand that scrap lead from some junk-man might contain almost any metal, including the troublesome one, zinc. However, reliable manufacturers like the Raymond Lead Co. should not be classed as one of those referred to in this paragraph.

"The use of antimony in solder is not to adulterate it. Some manufacturers cut the percentages of the mixtures, and add a small percent of antimony to help its appearance. It has a tendency to make a brighter face on the bar. This practice always results in condemning the article, as the layman cannot work it successfully with a soldering iron. It does not, however, cheapen the composition to the extent claimed by the author.

"In the main this covers our criticisms of the article."

How She Knew.

He—"You refuse me, then. Oh, well, there are others!"

She—"I know there are. I accepted one of them this afternoon."—Boston Transcript.

IT HAPPENED IN EVANSVILLE.

During the recent annual convention of the Indiana State Master Plumbers' Association, the good natured past-president, Chas. Maloney, is shown in the accompanying illustration surrounded by Peerless girls. These Peerless young ladies, of the Peerless Selling Co., served the Indiana master plumbers a breakfast given by that concern while the master plumbers were their guests. Among the visitors at that convention were such prominent Chicago master plumbers as Ernest Wagner, Wm. Hilliard and L. A. Clausen. These gentlemen faced the camera in Evansville in the attitude shown in the accompanying illustration. Their participation in the Indiana convention is reported as having been of the most agreeable nature.

Chas. Maloney and the "Peerless" Girls.

Prominent Illinois Master Plumbers at Indiana Convention.

Too Much Motor.

Wigg—"Henpeckke has bought a motor-boat and named it after his wife."

Wagg—"Can't manage it, eh?"—Philadelphia Record.

News of the Wholesalers and Their Products

Improvement in Manufacturing Establishments Noted—April Meeting of Illinois Chapter A. S. H. V. E.—Other News of Personal and Business Interest in the Trade

ERECTING NEW OFFICE AND FACTORY BUILDING.

W. H. Johnson & Son Co., heating contractors and manufacturers of heating specialties in Indianapolis, Ind., are erecting a two-story office and factory building on East St. Joseph street in that city.

THE SHIRLEY RADIATOR & FOUNDRY CO. WILL LOCATE ITS NEW PLANT IN INDIANAPOLIS, IND.

The Shirley Radiator & Foundry Co., whose plant at Shirley, Ind., was recently destroyed by fire, has decided to locate its new plant at Beach Grove, Indianapolis, Ind. Its temporary general offices are now located in the Union Trust building in Indianapolis.

WILL MANUFACTURE PLUMBING SPECIALTIES.

The Gove Manufacturing Co., of Riddeford, Me., has been incorporated with a capital of $10,000 to manufacture plumbing specialties. The officers of the company are: President, A. L. T. Cummings, Portland, Me.; treasurer, Lewis W. Stone, Biddeford, Me.; secretary, H. H. Gove, Biddeford, Me.

M. GLAUBER & CO. IN NEW LOCATION.

M. Glauber & Co., manufacturers of plumbing specialties, in New York City, have moved from 10 and 12 Christopher Street to 101 and 103 Varick Street, in that city. Both the offices and the stock rooms are fireproof and the company has also better facilities in the new location for conducting its growing business.

WESTERN PLUMBING SUPPLY CO. INCREASES ITS CAPITAL STOCK.

Western Plumbing Supply Co., of 117 and 119 North Desplaines Street, Chicago, has just issued an announcement to the effect that a change in ownership has taken place and that its capital stock has been increased. This will mean larger and better facilities for the company. The new officers of the company are: J. J. Tyne, president, and J. Z. Young, secretary and treasurer.

ATLANTIC RADIATOR CO. MAKING EXTENSIVE IMPROVEMENTS.

The Atlantic Radiator Co., with executive offices at 921-925 Chestnut Street, Philadelphia, Pa., and works at Huntingdon, Pa., announces that it has closed its foundry temporarily to enable it to make improvements and enlargements of buildings and equipment. Bids are being taken for a new core room, 60 x 80 feet, with necessary equipment, an electric elevator for the cupola, and a new testing plant. The company is also figuring on an overhead tramway or an industrial railway to connect the various departments of the plant. New patterns are also being added to enable the foundry to run to its fullest capacity. As the company has an ample stock of its products on hand, its business is being conducted without interruption. It is expected that the plant will be put in operation with full force at an early date.

THE APRIL MEETING OF THE ILLINOIS CHAPTER OF A. S. H. V. E.

The monthly meeting of the Illinois Chapter of the American Society of Heating and Ventilating Engineers will be held Monday night, April 8th, at Vogelsang's Restaurant, 177 West Madison Street, Chicago, dinner being served at 6 p. m. in the Banquet Room. The topic for discussion will be "The Heating and Ventilating Plant of the Northwestern University at Evanston, Ill." This meeting is in charge of the following gentlemen: J. M. Stannard, chairman; E. F. Capron, C. F. Newport and R. A. Widdicombe. A test of part of this plant was made some time since. The results of this test, further tests and a general description, illustrated with plans and photographs of the entire plant will be at hand.

PERSONAL MENTION.

Wm. R. Sweatt, president of the Electric Heat Regulator Co., of Minneapolis, Minn., passed through Chicago this week on his return from a vacation spent at health resorts in Florida.

* * *

H. O. Walker, who has been connected with the heating trade in Chicago, for several years, has accepted the position as manager of the New York branch of the Peerless Heater Co., of Chicago. His many friends in Chicago are congratulating him on his appointment to this position and assuring him that they will miss him.

* * *

Wm. R. Marshall, of the Universal Sanitary Mfg. Co., of New Castle, Pa., has been spending a couple of weeks in Chicago, his old stamping ground, and he called on some of his many friends in the plumbing trade.

* * *

Ira Fleming, advertising manager for the McCrum-Howell Co., New York City, has resigned to accept a similar position with the Standard Milling Co., of New York City.

* * *

J. L. Hague, the well-known heating contractor of Minneapolis, Minn., was in Chicago in the latter part of last week on his return from a visit to some of his old friends in Terre Haute, Ind.

A MASTER STROKE IN SALESMANSHIP.

The ingenuity of that popular salesman of the Rundle-Spence Mfg. Co., of Milwaukee, Wis., in the personof E. T. Webster, is now recognized as having served that concern with the master stroke of its sales department. Mr. Webster recently consummated a sale to the Pabst Brewing Co., through a Milwaukee contractor, of twenty san-

itary drinking fountains to be installed in the bottling department of the Pabst brewery. These bubbling fountains will provide a constant sanitary means for quenching the thirst of the employees of the bottling department of a brewery, and the bubbling fountains are the Rundle-Spence product. It is understood that the Rundle-Spence bubbling fountains produce drinking water of a known sanitary quality.

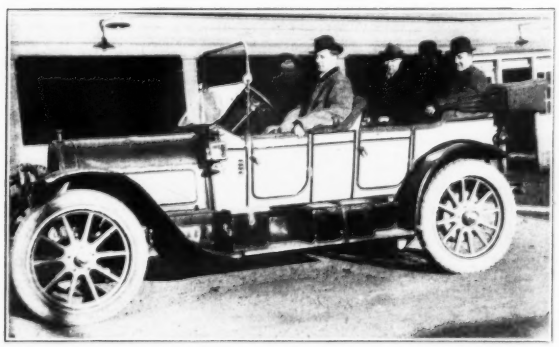
This feat in salesmanship, it is alleged, has been brought to the attention of the Noble Prize committee of Stockholm, Sweden. Whether or not this was on recommendation of Theodore Roosevelt, we are not in a position to state; however, Mr. Webster's friends are anxiously awaiting the committee's decision in awarding the next Grand Noble Prize.

ANNUAL MEETING OF THE CHICAGO BRANCH OF THE NATIONAL METAL TRADES ASSOCIATION.

The annual meeting of the Chicago Branch of the National Metal Trades Association was held at the Mid-day Club on Wednesday evening, March 27th. A record attendance was present. The reports of the officers and the employment department showed satisfactory results for the year's work. The election of officers for the ensuing year resulted as follows: President, N. W. Dingwall, of the Chicago Drop Forge Co.; vice-president, W. L. Kroeschell, of the Kroeschell Bros. Co.; treasurer, O. A. Olson, of the Simonds Mfg. Co.; secretary, Paul Blatchford, 1524 Tribune Bldg., Chicago; Executive Committee: N. W. Dingwall, of the Chicago Drop Forge Co.; W. L. Kroeschell, of Kroeschell Bros. Co.; O. A. Olson, of the Simonds Mfg. Co.; Elliott S. Norton, of the Acme Steel Goods Co.; Carleton L. Elmes, of the C. F. Elmes Engineering Works; L. C. Walker, of the Aermotor Co.; Francis S. North, of the Union Specialty Machine Co.; Staunton V. Peck, of the Link Belt Machy. Co.; Louis E. Burr, of the Woods Machinery Co., all of Chicago.

HE'S BUSY IN SAN FRANCISCO.

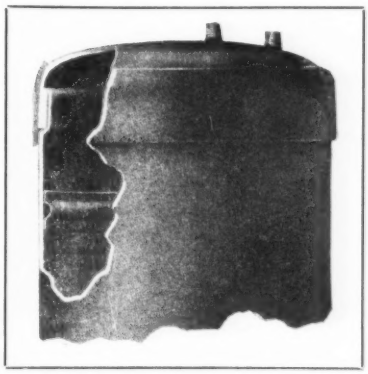
C. R. Heap, representing Wm. Heap & Sons, of Grand Haven, Mich., is sojourning in the interests of his concern on the Pacific Coast. His business activities are affording him considerable pleasure as is shown by the accompanying illustration. This picture, Mr. Heap writes, was taken in front of the famous Cliff House. The other gentlemen in the car known to the trade are Theo. F. Dredges, R. W. Hillman and B. E. Van Auken.



C. R. Heap and Friends in San Francisco.

CONTINENTAL COPPER RANGE BOILERS.

The John Trageser Steam Copper Works, 447-457 W. 26th Street, New York, in introducing to the trade the Continental Copper Range Boilers, state in their catalogue that these boilers will last a lifetime when properly installed, and the following paragraphs undoubtedly explain



The Continental Copper Range Boiler.

why copper boilers are a desirable product: "A great many years ago, there lived an old coppersmith, in a little town in Germany. The great ambition of his life was to weld copper. People ridiculed him and tried to dissuade him from his purpose. Perseverance, however, being part of his nature, he continued until finally he did succeed. His former critics were now his adherents and admirers. His invention, however, did not startle the world, because there was no great need for his discovery at the time. Being unable to develop his process, so that it could be used in the arts, he died leaving his work to be taken up by future generations. The process of fusing and welding copper is therefore nothing new and we do not claim to have found a lost art. Through the medium of a recent discovery we are enabled to join the edges of copper by fusion, without the use of solder or tin to secure a tight joint."

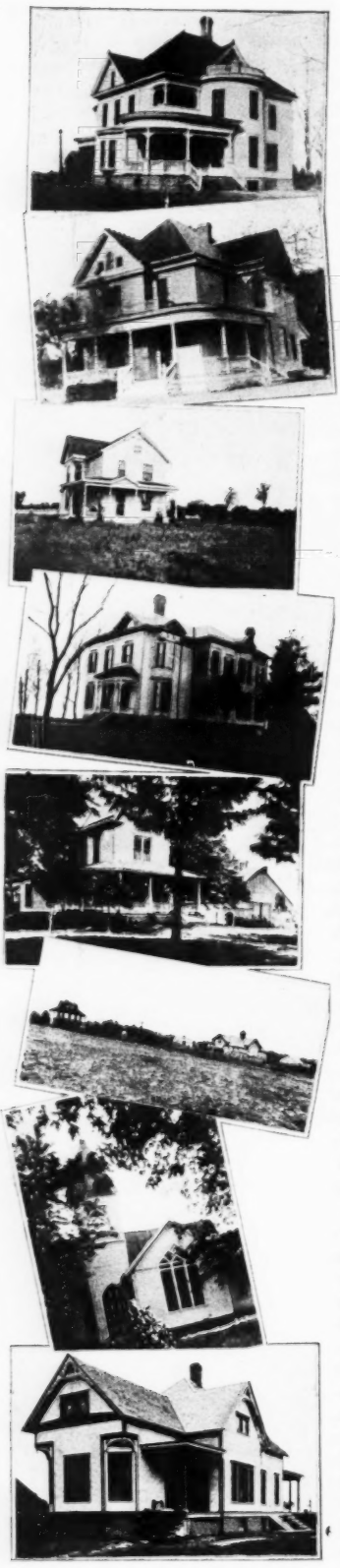
THE KELLOGG-MACKAY CO. ISSUES NO. 11 PRICE LIST.

The Kellogg-Mackay Co., manufacturers of "K-M-C" boilers and Kewanee radiators, has issued its price list No. 11, which supersedes all other lists. This new price list is issued from the general offices of the concern at 419 W. 18th Street, Chicago, and contains a complete tabulated price list of their products. This booklet should be in the hands of all progressive plumbing and heating men.

PFAU MANUFACTURING CO. HAVE SENT OUT USEFUL NOVELTY.

The Pfau Mfg. Co., of Cincinnati, Ohio, are sending to the trade an advertising novelty in the form of a very useful and convenient paper weight. "Domestic Engineering" acknowledges receipt of one of these paper weights with appreciation. This novelty contains an illustration of the Pfau manufacturing establishment in colors, together with a reproduction of their trade mark. This trade mark is well known to the plumbing industry.

MODERN COUNTRY HOMES.

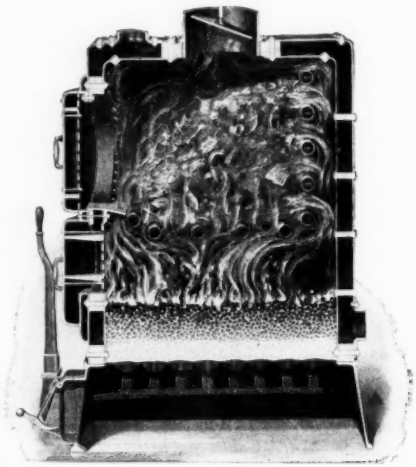


Manufacturers of products used in the plumbing and heating trades are beginning to promote vigorously the fact that the slogan of the farmers throughout the country seems to be for better homes. It is now a known fact that no farmer thinks of building a home that is not modern in every respect. This includes modern water systems, telephones and reliable and modern plumbing and heating systems; all of which go to make the life of the farmer a pleasure rather than drudgery as it was at one time.

These improvements have a peculiar significance to the plumbing trade and will continue to mean more as the master plumbers awaken to this spirit of progressiveness on the part of the farmers. It has been noted in the past that many plumbers have been able to secure profitable business in addition to their regular routine operations by the installation of acetylene lighting systems in farm homes. The fact that these acetylene lighting plants have proven satisfactory is making it easier every year for the plumbers to sell them. The illustrations of farm homes shown in this column are such homes as contain every modern plumbing and heating equipment. There are also installed in these homes acetylene lighting equipments manufactured by the Monmouth Acetylene Manufacturing Co., of Monmouth, Ill. In each of these homes installations were made by either plumbing or heating contractors, and the sale and installation of the lighting equipments have proved a source of profit to the contractors who installed the apparatus.

KEWANEE GARBAGE BURNING WATER HEATER.

The interesting features of the Kewanee water heating garbage burner, manufactured by the Kewanee Boiler Co., of Kewanee, Ill., are set forth in the recent literature of that concern. It is not generally known that garbage can be easily consumed, furnishing additional heat without expense, at the same time doing away with all odors and annoyances. The Kewanee garbage burning heater, (a sectional view of which is shown herewith,) is a riveted boiler built on the same principle as power boilers, and has the combined advantages of most of the water heaters, with those which the manufacturers have developed. The Kewanee garbage burner is being recognized as of a high standard of efficiency.



Sectional View of Kewanee Garbage Burning Heater.

THE KRIEBEL SYSTEM OF VAPOR VACUUM HEATING.

The Vapor Vacuum Heating Co., Philadelphia, recently installed the Kriebel system in a number of new buildings in the East. One of the many features of the modus operandi of the Kriebel system is a controller illustrated herewith which governs the operation of the system, permitting the air to pass out quickly without impediment, and filling the entire system with vapor with absolutely no pressure on the boiler. In describing this controller the Vapor Vacuum Heating Co. says that the controller works by expansion and is really the heart of vapor vacuum heating.

"It is constructed with an iron frame which is bolted to the joists or ceiling above the end of the air line; here there is a valve located which is operated by the expansion tube and is held rigidly in place at one end of the frame, the valve allowing the air to pass thru freely; when vapor or steam enters the controller, the brass tube expands and closes the valve against the escape of the steam or vapor. The system now becomes a closed system, and can be operated in the usual way.

"In operating the plant, a pressure is developed at the boiler sufficient to drive all air from the system, the fire

is checked and the boiler is fired only as hard as is necessary to maintain the required amount of vapor. As the pressure falls, the Controller prevents the return of air, and the system is at once under a partial vacuum, retaining the vapor in the radiators for a long period and allowing the vapor from the boiler to enter without resistance, the pressure on the system being below that of atmosphere.

"A compound vacuum and pressure gauge and a safety valve of the spring pop variety, absolutely tight, are essential features in the way of boiler trimmings. The greatest of care should be exercised by the steam fitter to have the piping erected in such a manner that all joints are tight and that there are no traps in it.

The Kriebel Vapor Vacuum Controller.

"In erecting the job, all steam mains should pitch from the boiler 1 inch in each 10 feet of length. All small piping should be reamed.

"All return connections from the radiators should be ½ inch in size and all of the horizontal branches of the air and return line being proportioned according to the size of the job. All branch connections, both flow and return, should be taken from the top of the main.

"In estimating the radiation necessary for use with this system, it should be figured on the basis of a good low pressure steam job. The fact that it may be used as a purely vapor job, circulating the vapor under a vacuum, or as a low pressure steam job means a variation of temperature of normally 150 degrees or less, to 220 degrees or more, and thereby makes the use of an excessive amount of radiation unnecessary."

OBITUARY.

Theodore Chapin Munger.

Theodore Chapin Munger, vice-president of the Cedar Rapids Pump Co., Cedar Rapids, Ia., died at his home in that city on Tuesday, March 19th, in his 73rd year. Mr. Munger was well known in the pump and plumbing trade in the Middle West and he leaves a large circle of friends who will be sorry to receive the intelligence of his demise.

Charles S. Doughty.

Charles S. Doughty, junior member of the plumbing firm of L. A. Doughty & Co., at Yarmouth, Me., died last week at his home in that city. Mr. Doughty was only 3[illegible] years old and he had a large circle of friends who mourn his untimely death.

Wise Johnny.

Teacher—"Now, Johnny, suppose I should borrow $100 from your father and should pay him $10 a month for ten months, how much would I then owe him?"

Johnny—"About $3 interest."—Boston Transcript.

For Father.

"Would you mind tooting your factory whistle a little?"

"What for?"

"For my father over yonder in the park. He's a trifle deaf and he hasn't heard a robin this summer."—Kansas City Journal.

THE METAL MARKET

A STEADY MARKET FOR PIG IRON.

Consumers of iron all over the country are purchasing freely for nearby and future delivery. While foundrymen are not as a rule, buying in large quantities except as their needs require, they are making more inquiries regarding prices for third-quarter delivery. The coal strike is having an important bearing on the situation, as already the price of coke had advanced fully 60 cents per ton, and there is a prospect that a further advance may be made in the near future. Some consumers have supplies for not more than two weeks, while others are well fortified against a shut-down. The activity in the purchase of coke has been more marked than in the purchases of pig iron. One important consuming interest, the Standard Sanitary Manufacturing Company, has placed an order for 6,500 tons of foundry iron.

Quotations are as follows:

No. 1 Northern Foundry, New York	$15.25 to $15.75
No. 2X Northern Foundry, New York	15.00 to 15.50
No. 2 Plain Northern Foundry, New York	14.75 to 15.00
No. 2 Northern Foundry, Chicago	14.00
No. 2 Southern Foundry, Birmingham	10.50

A BUOYANT ADVANCE IN COPPER.

Sales are being made at almost daily advances in price. When the market crossed 15 cents on March 22nd, it was thought that this would establish a high price for some time to come. Now it begins to look as though 16 cents will be reached more easily than 15 cents. The one thing that will hold the market back, and will prove a potent factor in the near future is the reluctance of European melters to buy on an advancing market. They will draw on their surplus stock, use more scrap metal in their mixture, and in every way delay the purchases of ingot copper. Without the active support of European buyers and large purchases by them, the market cannot long be held at its present figure. Consumption in America while large, is by no means phenomenal, and the present price looks too high to many conservative members of the trade. Electrolytic is selling at 15¼ cents.

LEAD.

Prices have advanced; both the American Smelting & Refining Company and outside interests are asking 4.20 cents, New York, and 4.12½ cents St. Louis.

PIG TIN.

The market is firm and prices are slightly higher at 43.50 cents. Consumers in America are buying freely.

OLD IRON.

The market is active, but there is such a large supply of scrap on the market, that prices do not seem to get out of the rut. Quotations in New York per gross ton are as follows:

No. 1 yard wrought, long	$10.50 to $11.00
No. 1 yard wrought, short	9.50 to 10.00
Heavy Melting Steel scrap	9.50 to 10.00
No. 1 railroad wrought	12.00 to 12.50
Machinery cast	11.00 to 11.50
Wrought pipe	9.75 to 10.00
Cast borings	6.00 to 6.50

DATES OF CONVENTIONS TO BE HELD IN THE NEAR FUTURE.

April 16 and 17, 1912.—Annual convention of the Pennsylvania State Association of Master Plumbers, at Philadelphia, Pa. Headquarters at the Hotel Walton. The officers of the association are: President, S. S. White, Pittsburgh, Pa.; treasurer, John H. Birchall, Allentown, Pa.; secretary, R. E. Carson, 1827 Perrysville Avenue, N. S., Pittsburgh, Pa.

April 16 and 17, 1912.—The annual convention of the Kentucky State Association of Master Plumbers, at Louisville, Ky. Headquarters will be established at the New Galt House, and the sessions will be held at the Master Plumbers' club-room. The officers of the association are: President, J. J. Fitzgerald, Lexington; vice-president, George Shardein, Louisville; secretary-treasurer, W. W. White, 606 York St., Newport, Ky.

April 23 and 24, 1912.—The tenth annual convention of the Oklahoma State Association of Master Plumbers, in Shawnee, Okla. The officers of the association are: President, W. V. Roesch, Shawnee; vice-president, W. F. Black, Enid; secretary, A. D. McMullen, Oklahoma City; treasurer, Walter Newman, Shawnee.

April 23, 24 and 25, 1912.—The annual convention of the Texas State Association of Master Plumbers, at Fort Worth, Tex. The arrangement committee for the convention is composed of the following master plumbers: W. E. Thatcher, chairman; P. E. Tosdick, Fred Robbins, Wm. Blevins and W. H. Payne, all of Fort Worth.

May 13, 14 and 15, 1912.—The annual triple convention of the American Supply and Machinery Manufacturers' Association, the National Supply and Machinery Dealers' Association and the Southern Supply and Machinery Dealers' Association at Norfolk, Va. Headquarters will be established at the Monticello Hotel. F. D. Mitchell, 309 Broadway, New York City, is secretary-treasurer of the American Supply and Machinery Manufacturers' Association.

May 14-17, 1912.—The sixth annual convention of the Master Boiler Makers' Association, at Pittsburgh, Pa. Headquarters will be established at the Fort Pitt Hotel.

June 4, 5 and 6, 1912.—The seventh annual meeting of the American Society of Inspectors of Plumbing and Sanitary Engineers, in St. Louis, Mo. The officers of the society are: President, Martin Conroy, St. Paul, Minn.; first vice-president, John Hefferman, Houston, Tex.; second vice-president, Lawrence J. Lawler, Pittsburgh, Pa.; secretary and treasurer, Thos. J. Claffy, City Hall, Chicago.

June 10-13, 1912.—The twenty-fourth annual convention of the National Association of Master Steam and Hot Water Fitters, at Atlantic City, N. J. Headquarters will be established at the St. Charles Hotel. The officers of the association are: President, Edward B. Denny, Newark, N. J.; vice president, John T. Bradley, St. Louis, Mo.; treasurer, Juan A. Almirall, New York City; secretary, Henry B. Gambers, New York City; sergeant-at-arms, John C. F. Trachsel, Philadelphia.

June 25, 26 and 27, 1912.—The fourth annual meeting of the National District Heating Association, in Detroit, Mich. The officers of the association are: President, A. D. Spencer, Detroit, Mich.; first vice-president, Warren Partridge, Springfield, Ill.; second vice-president, R. D. de Wolf, Rochester, N. Y.; third vice-president, Cadwallder Evans, jr., Pittsburgh, Pa.; secretary-treasurer, D. L. Gaskill, Greenville, O.

July 12 and 13, 1912. The Colorado Master Plumbers' Association will hold its convention in Cheyenne, Wyo. This association includes master plumbers of Colorado, New Mexico, Wyoming and Utah. The president of the association is Chris. Irving, 1525 Larimer St., Denver, Colo.

July 16, 17 and 18, 1912.—The 30th annual convention of the National Association of Master Plumbers, in Salt Lake City, Utah. The officers of the association are: President, Alfred C. Eynon, Canton, O.; vice-president, Frank J. Fee, New York City; secretary, Louis E. Deuble, 312 N. Market St., Canton O.; treasurer, William McCoach, Philadelphia.

NATIONAL ASSOCIATION ISSUES NEW RED BOOK.

The fiftieth edition of the "Red Book" of the National Association of Master Plumbers of the United States, has been mailed to the membership. This edition is noted as being for January, 1912. In the preface the author states that it is not claimed that this directory contains the names of all who are or all who profess to be master plumbers; neither does it contain the names of master plumbers from places where there are no members of the National Plumbers' Association.

A UNIQUE INVITATION

The members of the Master Plumbers' Association of Kentucky, have received the following urgent and unique invitation, signed by the president and the secretary of the organization:

"To the Master Plumbers of Kentucky; Greeting:

"Your President and Secretary earnestly request your presence at our Eighth Annual convention to be held at Louisville, April sixteenth and seventeenth, Nineteen hundred and twelve. We will establish headquarters at the New Galt House. Rates as follows: Single rooms without bath, $1.00; single rooms with bath, $1.50; with $1.00 for each additional person. We will hold our meetings at the club rooms of the Louisville Master Plumbers. We expect to make this the banner convention of the Association. We will have with us one of the most prominent members of the board of directors of the National Association, Mr. David H. Roberts, of Cleveland, Ohio. If you have never attended any of our conventions be sure and attend this one. Your board of directors will be ready to explain what an association of this kind can accomplish by organization. They have held several meetings during the past year. They will tell you how they defeated an obnoxious Plumbing Bill that was expected to pass the Legislature just adjourned. What no single city or individual could accomplish, this board of directors accomplished. They deserve the hearty support of the entire State Association. We expect to have passed at the next session of the State Legislature a State Wide Plumbing Bill that will have the endorsement of every member in the state. Now show them by attending the coming convention that you appreciate what they have done. We expect to make this an educational convention outside of the social feeling it will create. Let us all make up our minds to leave our business cares for two days and show the Louisville plumbers how many plumbers there are besides themselves. A long pull and a strong pull for Louisville, April 16th and 17th, Nineteen hundred and twelve. Yours fraternally,

J. J. Fitzgerald, President.
W. W. White, Secretary."

Salesmanship in the Plumbing Business

By J. S. Knox, Des Moines, Iowa

Address delivered before the recent convention of the Iowa Master Plumbers' Association, held at Des Moines, Iowa.

This is the first time I have ever talked to a group of plumbers on the subject of Salesmanship, and it is possibly the first time that many of you ever listened to a man on that subject.

I have had some peculiar ideas on plumbing. I am an outsider. I have wished many times that I had gone into the plumbing business, because I felt that the plumbers are right in a class with J. Piermont Morgan and all the rest of the aristocrats and plutocrats. I have thought of the plumbers as the richest bunch in the country, having an easy time and getting along famously. That is just the idea you fellows have disseminated over the country; that you are after easy money and that you get it; and you ought to be rich. But you are not rich, and what are you doing with the money—not that you have, but that you are supposed to have?

The last five years has witnessed a revolution in business. The Woolworth stores—the fire and ten cent stores—have revolutionized their whole business in the last two years; they have done more in the last two years than in the previous twenty. The National Cash Register Co. has revolutionized its business in the last five years. Almost every line of business is doing the same. What are you fellows doing in your line of business? It is a question of adjusting yourselves to the present conditions.

I spent quite a while as a salesman for the National Cash Register Co., and my business was systematizing the business of retail stores. I found a lot of trouble that you have in your own business. The average retail man in this country is not a business man. I have gone into a retail store and discovered that the proprietor lost a thousand dollars the previous year, but when I asked him where it was he couldn't find it. I have gone into a store and put these questions to the owner:

"How many customers do you have in here in a week?" "Don't know."

"How many a month?" "Don't know."

"How many a year?" "Don't know."

"How much credit business do you do?" "Don't know."

"How long since you invoiced?" "I have been in business forty years and have never invoiced."

"Then," I said, "you are just guessing, instead of knowing."

It is one thing to be a lawyer and another to be a business man. It is one thing to be a doctor and another to be a business man. It is one thing to be a plumber and another to be a business man. You men are professional men, just as the doctors and lawyers are professional men, but in addition you have to be first-class business men. There are many doctors who have spent years in schools and become great physicians, but they don't collect half what they ought to. The same is true of a lot of other professional men. To be a success in this day and age, a man must hitch business onto his professional knowledge.

Suppose you buy an article for a dollar and decide to sell it at cost; what do you sell it for? That is the basis of the whole proposition. Many would say that if they sell it at cost they sell it for a dollar. But it costs you 15 per cent to do business, and if you sell that article at one dollar you sell it at 15 per cent below cost. If you make 10 per cent profit you have to mark it at $1.25. One of the things the average man in any line of retail business must learn is cost, and when he sells things he must know what profit he is making. You have freight, insurance, drayage, and a little thing here and there, as well as depreciation, to add in when you are figuring up the price of your material.

What is salesmanship? I am going to give you a little definition. It is the ability to make a mutually profitable interchange of values. I want to illustrate that. If in a sale I make all the profit, I am not a salesman; I am a robber. On the other hand, if I make a sale and the other fellow makes all the profit, I am still not a salesman; I am either a philanthropist, an advertiser or a fool. Take your choice. As the gentleman who preceded me said, you are desperately afraid your competitor will get away with something. What are you in business for—your health or profit? I take it that you are in business for profit. When you figure on a job, as an honest business man you have to make enough off of that job to pay your expenses and pay you a legitimate profit; if you don't, you are foolish ever to accept it. If there is a pirate in your business who wants to do that work cheaper than you can afford to, let him have it. You can't afford to do business for nothing. Every business man in this world is entitled to profit enough in his business to educate his family, and have enough laid by when he reaches the age of sixty to retire if he wants to.

When there is something the matter with a man's business, there is usually something the matter with the man. There are just three things that the average man fails to do: He fails to think right, he fails to talk right, and he fails to write right when he writes an advertisement. Failure to think right and to talk right are possibly the two greatest causes of failure in this day and age. We have to think right in order to make the right amount of profit. We have to talk right if we sell our proposition.

Now I am going back to my definition of salesmanship. It is the ability to make a mutually profitable interchange of values. That brings in the mutual benefit idea—the idea of service. I believe the man who gives the best service is entitled to and naturally makes the most profit in the long run. A satisfied customer is the best advertisement. Can a man afford to do any job of work that won't give absolute satisfaction? No; if he does, he is killing his own business. There is such a thing as business-building—giving the right kind of service; and there is such a thing as business-killing—giving the wrong kind of service. The best kind of a job and the best material is going to build your business better than anything else.

The way to eliminate a competitor is to think about your own line of business—think what you ought to make and pay no attention at all to the other fellow. You can afford to sell on a certain basis and on no oth-

er; if you do sell on any other you are giving things away.

In salesmanship there are four big factors: The salesman, the article to be sold, the customer and the sale itself. What have you men done to make yourselves most efficient as salesmen? Personality, some one has said, is the biggest force in politics, in religion, in business, in life. What have you done to develop a stronger personality to make you a better leader? The philosophy of salesmanship is the philosophy of leadership, and the philosophy of leadership is the philosophy of success. A man must know how to develop the forces in himself before he can appeal to humanity as he ought to.

Take the customer: What do you know about human nature? What have you been doing technically to study human nature and get better acquainted with the other fellow?

Take the article to be sold: What are you doing to study the article that you are handling from the time it leaves the manufacturer to the time you sell it? How many gentlemen in this room can tell me all about the goods you are handling from the time they left the manufacturer until they reached your store? If you can do that, you are able to put up an enthusiastic talk in regard to your goods. Hugh Chalmers went over to Europe once to deliver a prize to a man named Smith who had sold the largest number of National Cash Registers of any salesman in the employ of the company during one year. When asked how he did it Smith said: "I defy any man in Germany to ask me a single question about a cash register that I can't answer right off the bat." If you men can do that, you know your goods.

I once stepped into a big furniture store in San Francisco and asked the salesman the price of a big easy chair. He couldn't find the price-tag, and he didn't know. So he called to another man and asked him what it was worth. He didn't know either, but he said, "Look on the tag and you will find it." The clerk finally found the tag, and it was marked $59. He said nothing about the magnificent chair; all in the world he seemed to know about it was the price on the tag. If he had told me what that chair was made of, how the leather was made, and the luxury of sitting in a chair like that, he would have aroused my interest and appealed to me; but he didn't even know the price of it.

Ought we to know the value of our proposition? The time is at hand when the man who sells must know the thing he sells from A to Z, and if he doesn't, the other fellow who does know it is going to get more business.

I want to give you an illustration of salesmanship. An automobile man in this city said to me: "Knox, I had a prospect right to the point of buying, and he asked me how soon I could deliver the automobile to him, and I told him I could get it in right away. Then he said he would come back the next week and talk it over." You see when the man asked how soon the machine could be delivered he hadn't said he would take it. How would you have answered that man if you had been there? How many people have said to you, "How soon could you get this bath-tub put in?" Just as soon as you satisfy a man's curiosity his interest is apt to go down. If a man puts a question like that to me, he is asking me to make a decision, and he is going to act accordingly. But my mind takes it for granted that he wants to buy, and I say right back, "How soon do you want it?" That makes him the one to do the deciding, and if he says, "In a week," I put it down.

I want to give you a few illustrations on the subject of suggestion, and to illustrate positive and negative suggestion a little. Suggestion is one of the greatest forces today in medicine, in surgery, in religion, in business, in salesmanship; but the average man doesn't seem to have got onto it very well.

Here are two bootblacks on opposite sides of the street; on Saturday afternoon the one on the west side of the street puts up a sign, "Get your shoes shined here;" but the one on the east side has his sign read, "Get your Sunday shine here." Each contains just five words. The first fellow thinks only of the man's shoes; the second appeals to the man's imagination through suggestion. He makes the man think: "Tomorrow is Sunday; I must go to church; we are going to have visitors; I have to be dressed up." The second fellow does just double the business that the first fellow does. Does it make any difference how we use the English language?

I was in a retail store one day, and heard a clerk say to a lady who came in: "Mrs. Brown, you wouldn't want any oranges today, would you?" A negative suggestion always tends to get a negative result. Of course she didn't want any oranges; the clerk has just told her she didn't! In another store this is what I heard a clerk say: "Mr. Jones, we have a car-load of oranges just in from Florida; they are rich and sweet and juicy. They are only forty cents a dozen and I believe you could use some of them." Mr. Jones became interested at once, and replied, "Why, yes, I believe I do want some oranges; I will take a dozen." And so the clerk went on suggesting until he had sold Mr. Jones a good-sized bill of goods. Then just as he was going out of the door he handed him a fine peach, calling his attention to its beauty and desirability, and said, "Just taste it and see how fine it is! You ought to have some of those to put on your table."

Ninety per cent of the salesmen in this country are continually using negative suggestions. It took me five years to break myself of it, and I forget it once in a while even now.

I was in a meat market and asked the butcher the price of bacon. "Thirty cents," he said; and he looked out of the window as much as to say, "It is thirty cents a pound, and you bet your life you are not going to get any of it!" Indifference—lack of interest—is one of the things that hurts our business. If I talk to you fellows in a singsong fashion, I lose your attention at once; and if I try to sell a bath-tub in the same way the customer will go to sleep. We must interest, arouse and enthuse our customers.

A man went into a store to buy a shirt. He looked at one that pleased him very well. It was $4, and he was about to say that he would take it when the clerk remarked, "This is a fine piece of junk." Well, when you hear that word "junk," you know you think of the man coming up the alley calling, "Old Rubbers and Old Iron." That man dropped the shirt and got out of the front door!

Some of you fellows are unmarried. If one of you should decide you wanted to marry, you wouldn't go up to see Mary and say to her, "Mary, you wouldn't want to get married, would you?" Of course she wouldn't, unless she thought it was the very last chance she had in the world!

I am glad to have come here this afternoon and to say a few words to you, and I want you to think along this line, because it gets business and influences people, and the ability to get business is the secret of success.

Statistics of Sewer Systems

Census Report on Sewers and Sewage Disposal in Cities of Over 30,000 Population in 1909

A preliminary statement of a special report on sewers and sewage disposal in cities of over 30,000 population in the United States in 1909, was issued recently by Director Durand of the Bureau of the Census, Department of Commerce and Labor. The statistics were prepared under the direction of Le Grand Powers, chief statistician for agriculture, and are subject to revision later.

This report forms a part of the annual report on the Statistics of Cities, which in each year take up some one subject for special study. It will deal principally with physical or general statistics.

The Supervisory Authority.

In 145 of the 158 cities covered by the report, the sewers and highways are under boards, departments, services, etc., usually having some such designation as "Board of Public Works," "Board of Public Service," "Engineering Department," or "Engineer's Department." The head of such boards, or departments, is generally designated superintendent, consulting engineer, or city engineer. In only twelve cities were the sewers under a department apparently distinct from that regulating highways. In more than 100 of the cities, the board of public works, or supervisory authority, had charge of all of the sanitary or highway services carried on as municipal activities. The health department supervised, or had supervisory control of refuse collection and disposal in fifty-two cities.

Mileage of Sewers.

The mileage of sewers classified by kind of system and construction material is shown for 157 of the 158 cities covered by the investigation. No report was obtained for Atlantic City, N. J., where the sewer system is owned by a private corporation.

The cities reporting had, exclusive of house and catch-basin connections, 25,011.2 miles of sewers, of which 18,361.5 miles were designed for conveying both domestic sewage and storm water, 5,258.3 miles for domestic sewage only and 211.4 miles for storm water only. Between 1907 and 1909, there was a larger percentage of increase in the mileage of sanitary sewers, or those designed to convey domestic sewage only, than in the mileage of all sewers combined. This was due principally to the building of sanitary sewers in the cities of the western states of light rainfall when frequently no provision is made for carrying off storm water by means of closed sewers.

The total mileage of sewers is classified by construction material as follows:

Stone	129.9 miles
Brick	6,295.4 "
Brick and concrete	220.5 "
Brick and stone	96.2 "
Concrete	217.6 "
Reenforced concrete	101.1 "
Vitrified pipe	16,844.0 "
Cement pipe	865.3 "
All other	241.1 "

Of the total mileage of sewers, 11,013, or 44.0 per cent were reported by the 16 cities of over 300,000 population. The following cities each had more than 1,000 miles of sewers:

New York	1,907.9 miles
Chicago	1,837.0 "
Philadelphia	1,185.1 "

The report shows other facts besides mileage as well as the total maintenance and operation expenses for 1909, and the expenses per 1,000 population served by the sewer system and per mile of sewer.

The average cost of sewer service per 1,000 population served, for all cities making complete reports, was $290.90. Individual cities show large variations from these figures. The highest costs were reported for Newton, Mass., $1,358.45; New Orleans, $1,214.63; and Sacramento, $965.71. The high cost in many cities is caused by the necessity of either pumping or purifying their sewage, or both.

The average cost of maintenance and operation of sewers, per mile of sewer, was $243.65. Cities with a high cost on this basis were Baltimore, $1,174.20; New York, $739.14; San Francisco, $716.16; Woonsocket, $651.19; Hoboken, $592.36; Providence, $575.74; and Sacramento, $520.72.

Flushing and Cleaning of Sewers and Catch Basins.

Detailed information is given of the flushing and cleaning of sewers and catch basins. Practically all cities employed more or less flushing in connection with the operation of their sewer systems. Nearly all flushed a portion of their system by means of hose attached to fire hydrants, but 65 made use of automatic flush tanks installed in their system, and 14 had one or more portable flush tanks. Many cities avoided practically all cleaning of sewers by means of continual flushing.

Nearly all cities did some cleaning of sewers, but only 77 reported the gross mileage cleaned. Some cities reported absolutely no cleaning of sewers. Many others reported that where stoppages occurred in the system, these were dislodged by means of jointed rods and then the sections of the system where such stoppages had occurred were thoroughly flushed.

The cost of cleaning per miles of sewer, for those cities reporting the cost, varied from $2.25 for Salt Lake City to $406.56 for Chicago.

Volume of Sewage.

The volume of sewage reported for many cities was an estimate, but in some cities the estimate was based upon the sewage pumped or purified, or upon their weir measurements.

The average daily discharge of sewage per capita of the estimated population served by the system, for all cities making reports, was 164 gallons. Included in that amount is a large volume of storm or surface water, water from factories, and water used in flushing the sewers.

Each of the three following cities reported a daily contribution by factories of more than 20,000,000 gallons; Cleveland, 21,000,000 gallons; Indianapolis, 37,500,000 gallons; Paterson, 22,000,000 gallons. Two-thirds of the total flow for Paterson was reported as being sewage from factories.

Exclusive of storm water and waste from factories and basing computations upon cities having accurate estimates

of sewage, the conclusion is arrived at that for many cities the per capita daily discharge of domestic sewage is not much, if any, in excess of 75 gallons. This conclusion is of interest principally in comparison with similar figures for most English cities, for which the average daily flow of sewage is about 25 gallons per capita, and in London, 34 gallons. In the construction of a new system of sewers for the City of Edinburgh, the combined estimate of sewage and rainfall was 42 gallons per head per day. From such comparison, it is apparent that there is a much freer use of water for domestic purposes in cities of the United States than in those of Great Britain.

Only 33 of the 158 cities of over 30,000 population pumped sewage. Of these only 11 reported pumpage of more than 50 per cent of the total sewage of the city.

Purification of Sewage.

Only 19 cities reported the purification of any portion of their sewage, and of these only 8 purified more than 20 per cent of the total, as follows: Providence, 97.3 per cent; Columbus, 100 per cent; Worcester, 99.5 per cent; Reading, 100 per cent; Houston, 100 per cent; Brockton, 100 per cent; New Britain, 100 per cent; and Woonsocket, 100 per cent.

Other cities reporting the purification of a portion of the total were: New York, St. Paul, Portland, Ore., Omaha, Des Moines, Akron, Altoona, Pawtucket, Canton, Little Rock, and Auburn, N. Y. In most of these cities the sewage purified came only from a small section of the city. Two cities, Providence and Worcester, relied principally upon chemical precipitation for the purification. Columbus relied upon settling and septic tanks and sprinkling filters. Elsewhere sand filter beds. Some of these cities used settling or septic tanks for partial purification of the sewage before it flowed to the sand filter beds. Of the 19 cities, 4 reported the use of 48 chemical precipitation tanks; 6 the use of septic tanks; and 4 the use of settling tanks. Of the same number of cities, 10 reported the use of 222 sand filter beds; 2 cities, Columbus, Ohio, and Reading, Pa., the use of 6 sprinkling filter beds, and Auburn, N. Y., the use of 4 contact beds.

The cost per million gallons of sewage treated on the sand filter beds varied from $1.71 for Altoona, Pa., to $119.74 for Pawtucket, R. I.

The per cent of suspended solids removed by means of passing the sewage through the sand filter beds, varied from 60 per cent for New Britain, Conn., to 100 per cent for Worcester, Mass. The percentage of suspended solids removed reported for other cities is as follows: New York, 85; Brockton, 80; Pawtucket, 85; and Woonsocket, 88. These percentages are much larger than those reported for Columbus, Ohio, (18) and Reading, Pa., (50), by means of sprinkling filter beds.

Several other cities than the 19 here reported are planning for the purification of all of their sewage within the near future. Among these are Waterbury, Conn., and Baltimore, Md., whose systems will be in operation within a short time. Auburn, N. Y., expects soon also to be purifying all its sewage.

NEWLY DISCOVERED PLUMBING DONE FOUR HUNDRED YEARS AGO.

That the Tudors were the best plumbers in the world is attested by the fact that a tunnel built four centuries ago by Cardinal Wolsey and through which water was conveyed from a spring by means of lead pipes is still in existence. It is not only in existence but is in practically as good condition as when it was first constructed. What good building this means may be understood when it is noted that directly over the tunnel huge trees are growing—one of them with at least five tons of timber in it—but neither their roots nor their weight have made any impression at all upon its walls.

Not so eternal have been the means whereby Wolsey had the water conveyed from Kingston Hill to Hampton Court. After it had made its way through a succession of wells and reservoirs, which still retain the old lead and stone, the water was taken down the hill in broad lead pipes and so on to Hampton. But, alas! it could not be protected from rapacious hands after it had served the great cardinal's purpose, for lead has a value for other and more harmful things than the conveyance of spring water. So as soon as Hampton Court ceased to depend for its drinking water upon the cardinal's spring people

Tunnel, Constructed 400 Years Ago, Through Which Water Was Conveyed by Means of Lead Pipe.

began to lay sacrilegious hands on the pipes. A considerable amount of the lead was, it is believed, melted down for ammunition during the civil war. The rest has been pilfered from time to time for various purposes, and some of it is said even now to be lying at the bottom of the Thames.

Both the old buildings and the spring itself are still almost as they were when the cardinal had completed his work of carrying the water in leaden pipes all the way from the top of Kingston Hill to his new home. Hitherto few people save the personal friends of the present owner have known of the existence of these remnants of the great man's enterprise, but a wonderful little glimpse into the past is to be obtained by anyone privileged to open the fast-shut door of the tunnel and descend into the subterranean wonderland.

As one enters, after going down a few stone steps, one finds himself in what might seem a sort of round chapel, substantially built, with decorative niches cut in the stone all round it. Then, going down and down, finds himself at the mouth of a tunnel or corridor, pitch dark itself, but leading to another chapel-like place lighted from above, larger inside than the first and similarly decorated with carved niches.

News of the Plumbing and Heating Contractors

Reports of the Week from Many Different Cities Show Both Business and Personal Activity in the Trade

NEWS FROM THE PACIFIC COAST.

San Francisco.

This month the plumbing supply business on the Coast shows a creditable increase over the same period for last year, according to the reports given out by leading local firms; although the business is not as brisk as was expected. Extreme conservatism prevails in all lines and until the World's Fair work is well under way there will probably not be any great change.

Sub-contractors in the building trades are not a little concerned just at present over the course of the San Francisco Board of Public Works in calling for general contractors' proposals in connection with a new fire house and a new police station soon to be erected by the city. It has been the policy in recent years for the city to ask for segregated bids on all municipal construction work, and the action of the Board of Public Works in departing from this custom, and the intimation of Mr. Casey, president of the Board, that such will most likely be the future policy of the city, has stirred up considerable discussion. Without doubt the sub-contractors will take some means of registering a vigorous protest against the said policy as almost without exception they prefer to submit their bids directly to the Board.

Two important corner-stone ceremonies were held this week on Sunday, namely; those in connection with the laying of the corner-stone of the $500,000 building of the German House Association, at Polk and Turk streets; and of the new St. Ignatius Church at Fulton St. and Parker Ave. The latter will be a handsome structure of the Italian Renaissance style of architecture and will cost $300,000. Announcement has just been made also that the First Congregational Church, at Mason and Post streets, is to have a new edifice to cost a quarter of a million dollars. Preliminary plans have already been made by the architects, Bliss & Faville, and one member of the church has subscribed $50,000 toward the building fund. It is the idea of the congregation to have the new church dedicated before the World's Fair.

After bids had been called for the third time on the heating and ventilating work of the San Francisco Girls' High School, the contract was finally awarded to the Charles E. Thomas Co. for $29,850.

The Turner Co. has been awarded the plumbing and electrical work on a six-story hotel building on O'Farrel St., Samuel Knight, owner and Nathaniel Blaisdell, architect, for about $14,000. The same company has been awarded the heating and electrical contract for the Sheedy Estate apartment building on Larkin St. for about $3,600; also the contract for the plumbing and heating work on a hotel building owned by Mrs. I. Strauss at Filmore and Union streets. Amount, $4,128.

The contract for the steam heating work on the U. S. Marine Corps building, Annie and Jessie streets, building owned by the Sharon Estate, has just been awarded to the John G. Sutton Co. for $1,850. The plumbing work went to the J. J. Looney Co. for $1,995.

The A. C. Oil Burner & Stove Co. has been incorporated in San Francisco by A. H. Jordan, P. M. Nippert and J. E. Clearwater. Capital stock, $25,000.

Elsewhere on the Coast.

James L. and William O'Brien, formerly with the hardware firm of Bollin & Matthews of Reedley, Cal., are looking for a suitable location at Reedley to establish a plumbing business of their own.

A new building is in the course of construction for the firm of Clark & Graham at Sierra Madre, Cal. This firm engages in the hardware, plumbing and sheet metal business.

The Schaw-Batcher Co., pipe manufacturers of Sacramento, Cal., are considering a plan for removing their plant to a site just outside the city limits to a district called Brighton.

R. H. Phillips of Laton, Cal., has moved his hardware and plumbing establishment to a new building at Laton. He also has a branch at Riverside, Cal., in charge of William Becker. Frank Marcotte is the manager of the plumbing shop at the Laton establishment.

A. Bailey and H. C. Moisel have organized the Economic Heating & Manufacturing Co., at Seattle, Wash. Capital stock, $5,000.

Meacham & Babcock have been awarded the contract for the heating plant at the new Franklin High School of Seattle, Wash.

NEWS FROM NEW ENGLAND.

Massachusetts.

Boston.—Mayor Fitzgerald has approved a contract for supplying piping for auxiliaries, exhausters and oil pumps at the Calf pasture pumping station, by the William H. Gallison Company for $2,968. The other bidders were Lumsden & Van Stone Co., $2,983, P. J. Sullivan $3,297.

Athol.—The town has appropriated $2,600 for a new heating plant in the Highland schoolhouse.

Marlboro.—George R. Hall & Co., have the contract for installing a heating and plumbing system in the new Southboro public library building.

Marlboro.—Louis Farley has the contract for installing a heating system in the residence of Louis Buisson, on Cross street.

Marblehead.—One of the articles considered at the annual town meeting was for an appropriation for the erection of a public comfort station in Crocker Park. The matter was referred to the Park commission.

New Hampshire.

Concord.—Lee Bros. have been awarded the contract for heating, plumbing and gas piping the new government building at Ellsworth, Me.

Maine.

Monson.—An appropriation of $2,000 for installing a heating plant in the grammar school house has been voted by the town.

Vermont.

St. Albans.—The St. Albans Plumbing & Heating Co. has the following contracts in hand: Steam heating system in the residence of H. R. Kimball; hot water heating system for the new postoffice building at Enosburg Falls; hot water heating system for the Rounds building at Richford, and hot water heating system for residence of Fuller C. Smith in this city.

Bellows Falls.—W. H. Bodim & Co., plumbers, met with a loss estimated at $10,000, in a fire which destroyed several structures in the business center of the town recently. The total fire loss was $200,000.

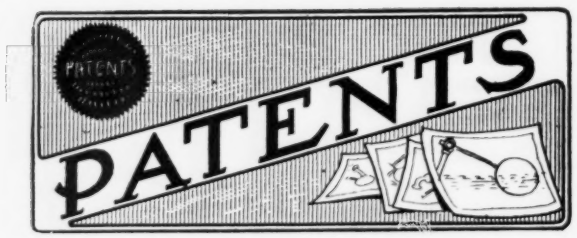
Spring Styles.

"Have you any ancestors, Mrs. Kelly?" asked Mrs. O'Brien.

"And phwat's ancistors?"

"Why, people you sphrung from."

"Listen to me, Mrs. O'Brien," said Mrs. Keily impressively. "Oi come from the rale sthock av Donahues that sphring from nobody. They sphring at thim."—Catholic Tribune.

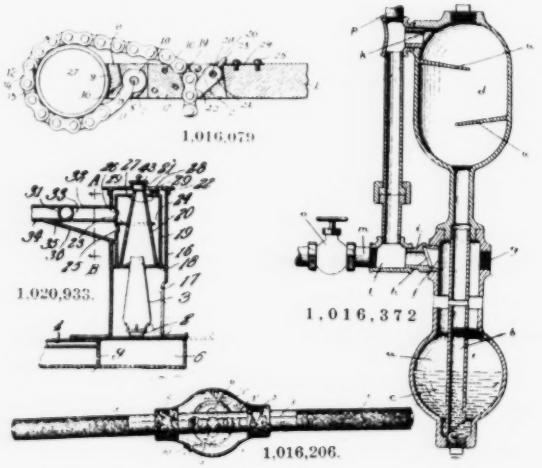


Heating Department.

1,016,079. Pipe-Wrench. James Maher, East Liverpool, Ohio. A gripping mechanism embodying a lever having a chain connected thereto, and means including a gripping block and a pivoted gripping member adapted to respectively engage opposite edges of said chain, the length of said member being the pivot and the gripping face being greater than the shortest distance between the pivot and the chain, whereby the pulling strain on the chain will chock the gripping member and chain against movement, said member being inclined toward the free end of the chain to move pivotally in the opposite direction to release the chock.

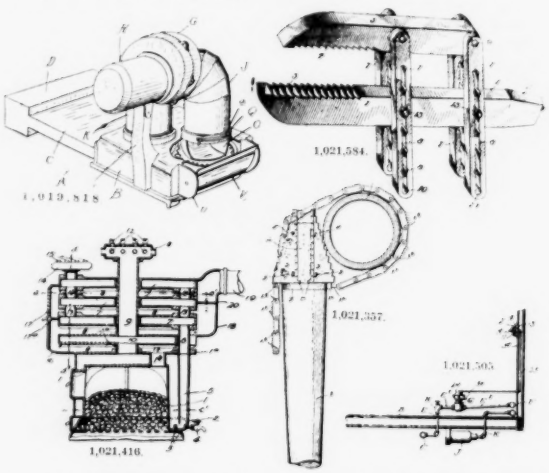
1,020,933. Heat-Distributing System. Walter Ernest Smith, Clay Center, Kans. In a heater, a boiler having an inlet port and an outlet port, a radiator consisting of communicating side and end tubes, a distributing tube extending from the outlet port to one of the end tubes and opening into said end tube, a return tube extending between and secured to the end tubes and opening into the other one of said end tubes, and a hollow reinforcing extension secured under the meeting portions of the distributing tube, the return tube and end tube, said extension communicating with the return tube and with the interior of the boiler through the inlet port.

1,016,206. Threading-Tool. James Mortimer Carpenter, Pawtucket, R. I. A threading tool comprising a frame containing a die, and a guide bar held crosswise adjacent the forward or working face of the die, said guide bar having a plurality of transverse passages or different diameters through it, said passages being arranged in different radial and in different transverse planes, to permit a considerable number of passages to be formed in a comparatively short length of bar, said bar being adjustable both longitudinally and rotatably with respect to said die, to bring any one of said passages into alinement with the bore of the die.



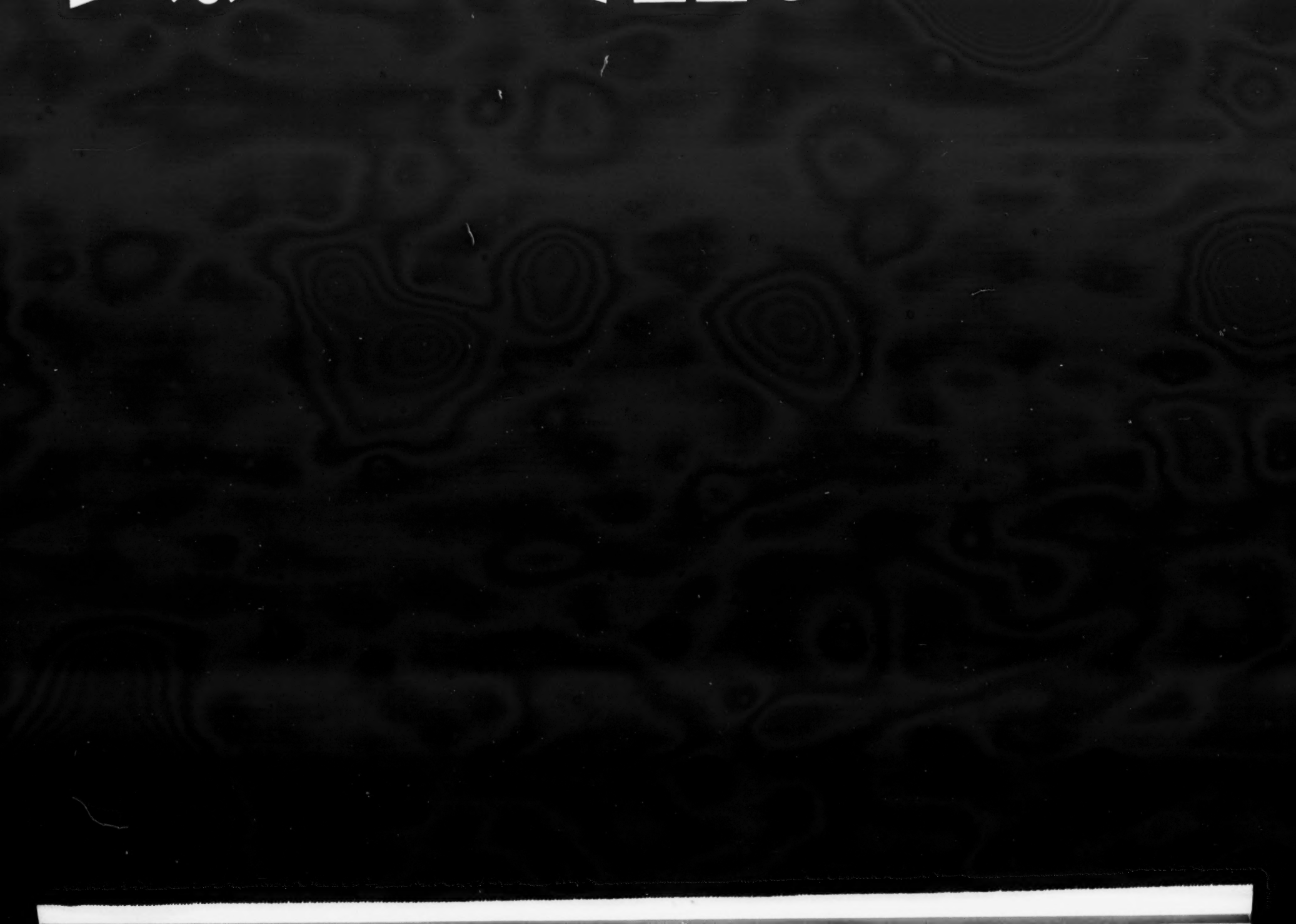
1,016,372. Pressure-Governor for Heating Systems. Grant Smith, Toronto, Ontario, Canada. The hereinbefore described device for governing pressure in a heating system, comprising a sealing chamber containing a sealing agent and having a port above the sealing agent for connection with a circulating pipe of a heating system, and a port separate from the first mentioned port for the feed of the heating agent into the sealing chamber above the sealing agent, a relief pipe, one end of which is contained in the sealing chamber and sealed by the sealing agent below the level of the ports, a separating chamber connected with the other end of the relief pipe and having a port, a by-pass pipe connected with the port of the separating chamber and with the second mentioned port of the sealing chamber, and a check valve pivoted within the by-pass pipe to permit of the flow of the heating agent from the by-pass pipe into the sealing chamber, and to prevent the flow of the heating agent and sealing agent from the sealing chamber into the by-pass pipe.

1,019,818. Ventilating Apparatus. Francis Joseph McMurdie, Detroit, Mich., assignor to American Blower Co., Detroit, Mich., a corporation of Michigan. 1. In ventilating apparatus, the combination with a casing having inlet and outlet openings, of an air propelling device, intake and discharge ducts leading from said device to the casing interior, relatively movable members within the casing formed each with an air passage, the passages registering with the air ducts and leading in different directions, and means for shifting the members to change the position of the air passages and the direction of travel of the air current through the casing.



1,021,584. Pipe-Wrench. Isaac M. Edmundson, McKeesport, Pa. A wrench comprising a bar having a handle at the inner end thereof, and the outer end thereof toothed, a jaw having the outer end thereof toothed and confronting the toothed end of said bar, sets of arms pivotally connected to the sides of said jaw, said arms having longitudinal slots formed therein with the ends of said slots terminating in openings and the walls of said slots, provided with oppositely disposed recesses, and pins mounted in the sides of said bar and extending through the slots of said arms, said pins corresponding in diameter to the diameter of the recesses and opening of said arms and having flat faces adapted to confront the walls of the slots of said arms whereby said arms can be shifted upon said pins and moved to lock said arms relatively to said pins.

1,021,416. Hot-Water Heating-Boiler. Thomas Duncan MacGregor, Davisville, Ontario, Canada. A hot water heating boiler comprising a water jacketed fire pot, a conduit connected to said jacket at one end and having radiator supply pipes connected to its opposite end, and a preheating section arranged to be heated by the products of combustion, said section being connected respectively with radiator return pipes and with the fire pot.

1,021,357. Chain Pipe-Wrench. John J. Donoghue, Chicago, Ill. A chain pipe-wrench comprising in combination, a handle; a head, said head consisting of a plurality of angular plates arranged radially about one end of said handle and having their vertices secured rigidly thereto.

1,021,505. Automatic Controlling Apparatus For Steam-Heating Systems. Frank F. Coggin, Matawan, N. J., and Egbert H. Gold, Chicago, Ill. Controlling apparatus for steam heating systems comprising in combination a main steam valve having a steam passage way, then through an auxiliary valve to control said passage way, a pressure chamber communicating with the passage way.